

PROJECT OPERATIONAL PLAN FOR THE
2004 TRIENNIAL ST. MATTHEW ISLAND
BLUE KING CRAB SURVEY



By:

Leslie J. Watson

Regional Information Report¹ No. 4K04-26

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615

June 2004

¹The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished division reports. These reports frequently serve diverse ad hoc informational purposes or archive basic data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

AUTHOR

Leslie Watson is a marine fishery research biologist for the Westward Region, Alaska Department of Fish and Game (ADF&G) in Kodiak, Alaska.

ACKNOWLEDGEMENTS

Thanks to Westward Region fishery biologists R. Alinsunurin and K. Gravel, and biometrician I. Vining for their comprehensive reviews of this operational plan. I acknowledge the Bering Sea/Aleutian Islands Shellfish Research staff, especially R. Alinsunurin, D. Barnard, R. Burt, S. Byersdorfer, R. Gish, K. Gravel, and D. Pengilly for their collective efforts to maintain and improve the triennial pot survey program.

PROJECT SPONSORSHIP

The 2004 St. Matthew Island blue king crab project is funded in part by a cooperative agreement from the National Oceanic and Atmospheric Administration (NOAA) under Federal Grant NA16FN2621: Bering Sea Crab Research II. The views expressed herein are those of the author and do not necessarily reflect the views of NOAA or any of its subagencies.

FOREWORD

The first ADF&G survey of St. Matthew Island blue king crabs was conducted in 1995 (Blau 1996), with subsequent triennial surveys in 1998 and 2001 (Blau and Watson 1999a, Watson and Burt 2002). A special nearshore survey to assess female crab distribution was conducted in 1999 (Blau 2000). The 1995, 1998, and 1999 surveys were funded under the Bering Sea Crab Test Fishery program initiated by ADF&G in 1990. Beginning in 2001, primary funding for the St. Matthew Island blue king crab project was supplied by NOAA federal grants to the State of Alaska. Operational plans for each of the four St. Matthew Island surveys are in Watson et al. (1995), Blau and Watson (1998 and 1999b), and Watson and Pengilly (2001).

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| LIST OF TABLES | i |
| LIST OF FIGURES | i |
| LIST OF APPENDICES | ii |
| ABSTRACT | 2 |
| INTRODUCTION | 3 |
| OBJECTIVES | 3 |
| METHODS | 4 |
| Survey Design | 4 |
| Standard Area | 4 |
| Shallow-Waters Area | 4 |
| Catch Sampling | 5 |
| OTHER SHIPBOARD PROJECTS | 6 |
| Blue King Crab Food Habits | 6 |
| Ocean Temperature Data | 6 |
| <i>Chionoecetes</i> Specimen Collections | 6 |
| Photographic Guide | 6 |
| Fish Skeletal Comparative Collection | 7 |
| DATA ANALYSIS | 7 |
| SCHEDULES AND PERSONNEL | 8 |
| REPORTS | 8 |
| LITERATURE CITED | 9 |
| TABLE | 11 |
| FIGURES | 12 |
| APPENDIX | 14 |

LIST OF TABLES

| <u>Table</u> | <u>Page</u> |
|--|-------------|
| 1. Relative frequency distribution of reproductive-condition classes of female blue king crabs captured in the vicinity of St. Matthew Island (Pengilly and Watson, unpublished manuscript). | 11 |

LIST OF FIGURES

| <u>Figure</u> | <u>Page</u> |
|---|-------------|
| 1. Midpoint locations of the 141 primary and 24 secondary stations to be fished during the 2004 St. Matthew Island blue king crab survey. | 12 |
| 2. Stratum 3 schematic array with bathymetric background for shallow-water stations (301-310) to be sampled during the 2004 St. Matthew Island pot survey. | 13 |

LIST OF APPENDICES

| <u>Appendix</u> | <u>Page</u> |
|--|-------------|
| A. Shipboard Instructions for the 2004 Triennial St. Matthew Island Blue King Crab Survey. | 15 |
| APPENDIX B: SURVEY ITINERARY AND LOCATION | |
| B.1. Itinerary for the 2004 St. Matthew Island blue king crab pot survey..... | 25 |
| B.2. Layout of the 22 station blocks to be fished during the 2004 St. Matthew Island blue king crab pot survey | 26 |
| B.3. Midpoint locations of the 141 primary and 24 secondary stations to be fished during the 2004 St. Matthew Island blue king crab survey | 27 |
| C. Equipment List. | 31 |
| APPENDIX D: SURVEY DATA FORMS | |
| D.1. Pilot House Log. | 34 |
| D.2. Station Summary and Email Report. | 36 |
| D.3. Crab Survey Data Form. | 39 |
| D.4. Species Composition Form. | 41 |
| D.5. Fish Length Form. | 43 |
| D.6. Tagged Crab Recovery Form. | 45 |
| D.7. Crab Stomach Sample Form. | 47 |
| D.8. Temperature Data Log. | 48 |
| APPENDIX E: BLUE KING AND SNOW CRAB CLUTCH FULLNESS CATEGORIES | |
| E.1. Blue king crab clutch fullness categories. | 49 |
| E.2. Snow crab clutch fullness categories. | 50 |
| F. <i>Chionoecetes</i> Specimen Collections and Data Forms. | 51 |
| G. Fish Skeletal Comparative Collection. | 55 |

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

PROJECT OPERATIONAL PLAN

Title: St. Matthew Island Blue King Crab Project

Yellow Book Project No(s): CP-712

Project Leader: Leslie Watson PCN: 11-1428
Biometrician: Douglas Pengilly PCN: 11-1202

Date Submitted: May 2004

Region: Westward
Fishery Unit: Bering Sea/Aleutian Islands Crab
Fishery: St. Matthew Island Blue King Crab (Area Q2)
Fishery Management Plan: 5 AAC 34.917. SAINT MATTHEW ISLAND SECTION
BLUE KING CRAB HARVEST STRATEGY

APPROVALS

| Level | Signature | Date |
|-------------------------------|-----------|-------|
| Project Leader: | _____ | _____ |
| Biometrician: | _____ | _____ |
| Research Supervisor: | _____ | _____ |
| Regional Supervisor: | _____ | _____ |
| Headquarters' Receipt: | _____ | _____ |
| Headquarters' Approval | _____ | _____ |
| Headquarters' Recommendation: | | |
| Further Review: | _____ | _____ |
| Approval: | _____ | _____ |

ABSTRACT

This report describes the project operational plan for the 2004 St. Matthew Island blue king crab *Paralithodes platypus* triennial pot survey. A description of the objectives, survey area, sampling methodologies, data analysis, and reporting are given. The survey will be conducted by Alaska Department of Fish and Game biologists aboard the chartered 39.6-m vessel, FV *Sultan* from 24 July to 22 August 2004. One hundred forty-one primary stations and up to 24 secondary stations near St. Matthew, Hall, and Pinnacle Islands will be sampled using a series of four-pot stations during the 30-day survey. Relative stock abundance indexes of male and female blue king crabs will be obtained and compared with indexes from the 1995, 1998, and 2001 triennial St. Matthew Island surveys. Bottom water temperature profiles will be collected across the depth range of fished pots.

Keywords: blue king crab; *Paralithodes platypus*; St. Matthew Island, Alaska; pot survey; spatial distribution; abundance

INTRODUCTION

The St. Matthew Island Section for blue king crabs *Paralithodes platypus* is within the Northern District of the Bering Sea king crab registration area (Area Q2) and includes the waters north of the latitude of Cape Newenham (58°39' N. lat.) and south of the latitude of Cape Romanzof (61°49' N. lat.) (Bowers et al. 2003). Commercial fisheries for blue king crabs in the St. Matthew Island Section occurred from the 1977 through the 1998 seasons, with a peak harvest of 9.5 million pounds landed in 1983. The St. Matthew Island blue king crab fishery was declared overfished in 1999 due to an estimated stock size lower than the minimum stock size threshold specified in the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (NPFMC 1998). The fishery has remained closed through the 2003 season because stock levels have been below the threshold specified in the harvest strategy or have been too low to provide the minimum harvest level specified in state regulation.

Pot surveys with the primary objective of determining the distribution and relative abundance of male and female blue king crabs in the St. Matthew Island area have been conducted by the Alaska Department of Fish and Game (ADF&G) on a triennial basis since 1995 (Blau 1996, Blau and Watson 1999a, Watson and Burt 2002). The pot surveys are intended to augment data on St. Matthew Island blue king crab spatial distribution and abundance that is supplied annually by summer trawl surveys performed by the National Marine Fisheries Service (NMFS) (Rugolo et al. 2003). Data from the annual trawl surveys conducted by NMFS are used to estimate population abundance of St. Matthew Island blue king crabs and to determine harvest levels for the subsequent fall commercial fishery. However, population estimates using the NMFS trawl survey data are uncertain due to trawl survey station layout, unsuitable trawl habitat surrounding St. Matthew Island, and seasonality effects as discussed in Pengilly and Watson (2004).

Size frequency data from triennial ADF&G pot surveys have been considered in discussions of stock condition since 2001. However, the short time series of relative abundance information from the 1995, 1998 and 2001 surveys precludes analysis of stock trends (Vining and Zheng 2004). The 2004 triennial St. Matthew blue king crab pot survey is necessary for assessing the stock condition relative to rebuilding from an overfished condition and to sustain the time series of data that is needed for incorporation into multiple-year stock assessment models. This operational plan describes the locale, design, and methods for the 2004 triennial blue king crab survey.

OBJECTIVES

Prioritized objectives for the 2004 St. Matthew Island triennial blue king crab survey are as follows:

1. Obtain a relative stock abundance index (pot survey catch per unit effort) of blue king crabs in the waters south of St. Matthew Island.
2. Describe a portion of the blue king crab component residing in shallow waters from 11 fm to 20 fm (20 m to 37 m) relative to sex, size, and reproductive characteristics.

3. Characterize the substrate at each survey station and sample water temperatures across the depth range fished within the survey area.
4. Collect blue king crab stomachs needed for an ongoing ADF&G food habits study.
5. Describe overall species composition in the survey area, with emphasis on snow crab *Chionoecetes opilio* distribution and relative abundance.

METHODS

Details on methods are provided in the Shipboard Instructions (Appendix A). An overview on activities and methods is presented here.

The 2004 blue king crab pot survey will be conducted aboard the chartered 39.6-m (130-ft) vessel, FV *Sultan* from approximately 24 July to 22 August 2004 in the St. Matthew Island area. The 2004 survey station grid encompasses the area between 59°30' - 60°30' N. latitude and 172°00' - 173°55' W. longitude (Figure 1). The 30-day charter will begin and end in Dutch Harbor, with a captain, engineer, three crewmen, and five ADF&G biologists aboard. Approximately four of the 30 days allotted will be necessary for travel to and from the survey grounds and up to two days for necessary gear preparation. The proposed survey itinerary is outlined in Appendix B.1.

Survey Design

Standard Area

The 2004 survey area and station array is based on the survey grid established for the 1995 ADF&G survey, which was designed to cover areas not surveyed by the NMFS annual eastern Bering Sea trawl survey due to untrawlable substrate. The 1995 survey area was determined from the geographic distribution of historic blue king crab fishery effort and the distribution and density of blue king crabs in historic NMFS trawl surveys (Watson et al. 1995). Two geographic strata with different densities of survey stations were defined: a double-station density stratum directly south of St. Matthew Island (Stratum 2), and a single-station density (Stratum 1) southward and offshore of Stratum 2 (Figure 1). Station layout in Stratum 2 is based on a grid in which stations are spaced 5 nmi north-to-south and east-to-west and overlaid with another 5 X 5 nmi grid offset by 2.5 nmi north-to-south and east-to-west. Stratum 2 has historically produced the highest catches of mature females and legal males and contains the areas of highest fishery effort in historic fisheries. Station layout in Stratum 1 is based on a single 5 X 5 nmi grid. Each station in Stratum 1 and 2 will consist of four rectangular king crab pots set 0.125 nmi apart and arrayed either north-to-south or east-to-west, depending on wind conditions.

Shallow-Waters Area

Prior to the shallow-water surveys conducted by ADF&G in August 1998 and 1999 neither NMFS nor the ADF&G pots surveys sampled the shallow-water (≤ 20 fm) habitat in the St. Matthew area,

resulting in the non-assessment of ovigerous female crabs that were believed to reside in the shallows. The presence of large numbers of ovigerous females in shallow waters was confirmed in those surveys (Blau and Watson 1999a and Blau 2000). In the 1998 and 1999 shallow-waters surveys, ovigerous females comprised nearly 82% of the 3,011 captured females (Table 1; Pengilly and Watson unpublished manuscript). In the standard pot surveys in 1995, 1998, and 2001, however, ovigerous female catches averaged just 3%. Because so few ovigerous females are captured in standard pot and trawl surveys, reproductive characteristics of that group are not adequately sampled. Hence temporal trends in the abundance of reproductive females are not being monitored within the current triennial survey plan. For that reason, 10 shallow-water stations have been identified near the south shore of St. Matthew Island for sampling during the 2004 survey (Figure 1). Each station in the new 'Stratum 3' will be arrayed 2 nmi from adjacent stations and each station will consist of four king crab pots set in a line perpendicular to shore and spaced at 3-fm intervals to sample the 11-20 fm depth range (Figure 2).

The king crab pots will be supplied by ADF&G and are identical to those used in the 1998 and 2001 St. Matthew blue king crab surveys. Each pot measures 7' x 7' x 2.8', is fitted with 2 3/4" stretched mesh on all webbing, and has two opposing tunnel eyes measuring 8" x 36". Pots will be pulled in the sequential order that they are set. The target soak time for each pot is 30 to 36 hours; each pot will be baited with one gallon of frozen chopped Pacific herring *Clupea pallasii*.

A minimum of 141 stations (stations 1-121, 146-152, 201-203, and 301-310) will be fished. If weather and other survey conditions allow, up to 24 additional stations (122-145) will also be fished. One 'block' of 6 to 8 stations will be set and pulled each day as outlined in Appendix B.2. Mid-point station coordinates are listed in Appendix B.3.

All necessary equipment for the survey is listed in Appendix C.

Fishing parameters such as station and sequential pot number, set and pull date and time, bottom type, latitude, longitude, gear performance, and water temperature will be recorded by the vessel captain on the Pilot House Log (Appendix D.1). Blue king crab catch data will be summarized by sex and size class and reported daily to ADF&G personnel in Kodiak and/or Dutch Harbor on the Station Summary and E-mail Report (Appendix D.2).

Catch Sampling

The contents of each pot fished will be enumerated to provide catch per unit effort data for blue king crabs, Tanner crabs *Chionoecetes bairdi*, snow crabs, and hair crabs *Erimacrus isenbeckii* by sex and size. Legal size of male blue king (5.5"), hair (3.25"), Tanner (5.5"), and snow (3.1") crabs will be determined by measuring the carapace width outside the lateral spines (ADF&G 2003). Female reproductive condition will be characterized by clutch fullness, egg color, development and condition (presence of dead eggs). Each sampled crab will be documented on the Crab Survey Data Form (Appendix D.3).

Captured invertebrates and fish will be identified to species whenever possible, counted and reported on the Species Composition Form (Appendix D.4). Commercially important fish species

will be measured as time allows (Fish Length Form; Appendix D.5). Recaptured tagged blue king crabs will be sampled as described above and released alive with tag intact (Tagged Crab Recovery Form; Appendix D.6). Survey catch sampling methods are detailed in Appendix A.

OTHER SHIPBOARD PROJECTS

Blue King Crab Food Habits

In September 2003, 28 intestinal tracts (stomachs) were collected from male and female blue king crabs captured near the Pribilof Islands for later laboratory analysis (R. Gish, ADF&G – Kodiak, pers. comm.). In support of that initial collection, up to 100 additional stomach samples will be collected. Location, date, sex, and carapace size (mm CL) of sampled crabs will be recorded on the Crab Stomach Sample Log (Appendix D.7). Data and samples will be returned to R. Gish in Kodiak at completion of the survey. Shipboard collection methods are detailed in Appendix A.

Ocean Temperature Data

Ocean bottom temperature profiles (°C) will be collected from select pots to sample the depth range fished within the survey grid. Five submersible temperature loggers will be deployed in selected pots to obtain temperature data concurrent to blue king crab catch per pot data. All logger deployments will be documented on the Temperature Data Log (Appendix D.8).

Chionoecetes Specimen Collections

Collection and sampling for three *Chionoecetes* projects will occur during the 2004 pot survey. Genetic tissue samples from *Chionoecetes* hybrids will be collected for later analysis in a comparative project involving snow crabs from the Gulf of St. Lawrence, Greenland, and the eastern Bering Sea. The second study will utilize collected ova and egg clutches from female snow crabs to evaluate biennial reproductive potential. The last study will examine size at maturity of male snow crabs from the pot survey as compared to the annual NMFS eastern Bering Sea trawl survey that occurs 7-10 days prior to the pot survey. Protocols and forms are described in Appendix F.

Photographic Guide

Digital photographs of the invertebrates and fish commonly captured on triennial St. Matthew Island pot surveys will be taken on board the survey vessel for post-survey production of a field identification guide.

Fish Skeletal Comparative Collection

Survey captures of any of the fish species listed in Appendix G will be frozen whole, labeled, and returned to S. Dickson (University of Alaska-Fairbanks, Interior-Aleutians campus, Unalaska) at the completion of the survey.

DATA ANALYSIS

Catch per unit effort (CPUE) will be summarized by station location and by sex-size categories for blue king, snow, Tanner, and hair crabs as shown below. Maps depicting catch per unit effort by station will be prepared to identify spatial trends in blue king crab and snow crab densities. Frequency distributions of size by shell age will be summarized and separately graphed for male and female blue king crabs and snow crabs.

Blue King Crabs

- Sublegal Males: all sublegal sized (< 5.5 inches CW outside lateral spines) <105 mm CL; ≥ 105 mm CL.
- Legal Males: all legal-sized (≥ 5.5 inches CW outside lateral spines) new-shell <134 mm CL; new-shell ≥ 134 mm CL and old-shell crabs.
- Females: immature (no external evidence of ovigerity); mature (external embryos or empty egg cases present).

Snow Crabs

- Sublegal Males: <79 mm CW **inside** lateral spines.
- Legal Males: 79 - 101 mm CW **inside** lateral spines.
- Legal Males: >101 mm CW **inside** lateral spines.
- Females: Immature and mature as identified by shape of the abdominal flap (Jadamec et al. 1999).

Tanner Crabs

- Sublegal Males: <5.5 inches CW outside lateral spines.
- Legal Males: ≥ 5.5 inches CW outside lateral spines.
- Females: Immature and mature as identified by shape of the abdominal flap (Jadamec et al. 1999).

Hair Crabs

- Sublegal Males: <3.25 inches CW
- Legal Males: ≥ 3.25 inches CW
- Females: same as for female blue king crabs.

SCHEDULES AND PERSONNEL

| Date | Activity | Personnel |
|---------------------|--|--|
| 1/04-4/04 | Project planning, solicit vessel charter bids | Watson |
| 1/04-7/04 | Prepare POP, PRs for major purchases, shipboard instructions, survey gear. | Watson |
| 7/24/2004-8/22/2004 | Conduct 30-day survey near St. Matthew Island. | Watson, Alinsunurin, Byersdorfer, Gilson, Gravel |
| 9/2004 | Edit and enter survey data. | Watson |
| 10/04-12/04 | Compile, analyze, and write survey report. | Watson |

REPORTS

Results of the 2004 St. Matthew Island blue king crab pot survey will be reported in a Regional Informational Report. The relative abundance of blue king crabs as indexed by pot survey catch per unit effort by size-sex classes and an assessment of female reproductive condition will be reported. The schedule for Regional Information Reports pertaining to this project, including this Project Operational Plan, is given below.

| Date | Report | Author(s) |
|-------|--|-----------|
| 5/04 | Project Operational Plan | Watson |
| 12/04 | Results of the 2004 St. Matthew Island blue king crab pot survey | Watson |

Semi-annual progress reports and final reports for NOAA grant NA16FN2621 that pertain to this project will be prepared according to the following schedule.

| Date | Report | Author(s) |
|-------|-----------------------------|-------------------------|
| 6/04 | Semi-annual progress report | Pengilly, Watson et al. |
| 12/04 | Semi-annual progress report | Pengilly, Watson et al. |
| 6/05 | Semi-annual progress report | Pengilly, Watson et al. |
| 12/05 | Semi-annual progress report | Pengilly, Watson et al. |
| 6/06 | Semi-annual progress report | Pengilly, Watson et al. |
| 8/06 | Final project report | Pengilly, Watson et al. |

LITERATURE CITED

- Alaska Department of Fish and Game (ADF&G). 2003. Regulations of the Alaska Board of Fisheries for statewide commercial shellfish fishing in Alaska, 2003 – 2005 edition, Juneau, 230 pp.
- Blau, S.F. 1996. The 1995 St. Matthew Island blue king crab survey. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 4K96-27, Kodiak.
- Blau, S.F. 2000. Nearshore blue king crab survey St. Matthew Island, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K00-42, Kodiak.
- Blau, S.F., and L.J. Watson. 1998. Project Operational Plan: 1998 St. Matthew Island blue king crab project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K98-49, Kodiak.
- Blau, S.F., and L.J. Watson. 1999a. St. Matthew Island blue king crab survey, 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K99-66, Kodiak.
- Blau, S.F., and L.J. Watson. 1999b. Project Operational Plan: 1999 St. Matthew Island blue king crab nearshore survey. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K99-58, Kodiak.
- Bowers, F.R., B. Failor-Rounds, J. Soong, A.E. Gilson, and C. Lillo. 2003. Annual management report for the commercial shellfish fisheries of the Bering Sea, 2002. Pages 80 – 84 in Annual management report for the commercial and subsistence shellfish fisheries of the Aleutian Islands and Bering Sea and the Westward Region's shellfish observer program, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K03-52, Kodiak.
- Jadamec, L.S., W.E. Donaldson, and P. Cullenberg. 1999. Biological field techniques for Chionoecetes crabs. University of Alaska Sea Grant College Program Report AK-SG-99-02, Fairbanks.
- North Pacific Fishery Management Council (NPFMC). 1998. Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs. North Pacific Fishery Management Council, Anchorage.
- Pengilly, D., and L.J. Watson. Distribution of female blue king crabs *Paralithodes platypus* in the St. Matthew Island area, Alaska, 1980–2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, unpublished manuscript, Kodiak.

LITERATURE CITED (Cont.)

- Pengilly, D., and L.J. Watson. 2004. Recoveries of tagged blue king crabs *Paralithodes platypus* in St. Matthew Island commercial fisheries, 1995 – 1998. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 4K04-2, Kodiak.
- Rugolo, L.J., R.A. MacIntosh, C.E. Armistead, J.A. Haaga, and R.S. Otto. 2003. Report to industry on the 2003 eastern Bering Sea crab survey. National Marine Fisheries Service, Alaska Fisheries Science Center, Processed Report No. 2003-11, Kodiak.
- Vining, I., and J. Zheng. 2004. Status of king crab stocks in the Bering Sea in 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K04-6, Kodiak.
- Watson, L.J., D. Pengilly, and S.C. Byersdorfer. 1995. Project operational plan for the 1995 St. Matthew Is. blue king crab tagging survey. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report No. 4K95-48, Kodiak.
- Watson, L.J., and R. Burt. 2002. The 2001 triennial St. Matthew Island blue king crab survey and comparisons to the 1995 and 1998 surveys. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K02-37, Kodiak.
- Watson, L.J., and D. Pengilly. 2001. Project operational plan for the 2001 St. Matthew Island blue king crab tagging survey. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K01-41, Kodiak.

Table 1. Relative frequency distribution of reproductive-condition classes of female blue king crabs captured in the vicinity of St. Matthew Island (Pengilly and Watson, unpublished manuscript).

| Data Source | Total Females | Percent Immature | Percent Mature-Ovigerous | Percent Mature-Barren |
|--|---------------|------------------|--------------------------|-----------------------|
| NMFS EBS Trawl Survey (1980-2002) | 1,055 | 70.9 | 3.0 | 26.1 |
| ADF&G Standard Pot Survey (1995, 1998, 2001) | 6,064 | 21.9 | 2.8 | 75.3 |
| ADF&G Shallow-Waters Pot Survey (1998, 1999) | 3,011 | 2.9 | 81.7 | 15.4 |
| Fishery Observer (1990-1998) | 15,455 | 38.0 | 0.2 | 61.8 |
| Total Aggregated Data | 25,585 | 31.4 | 10.5 | 58.1 |

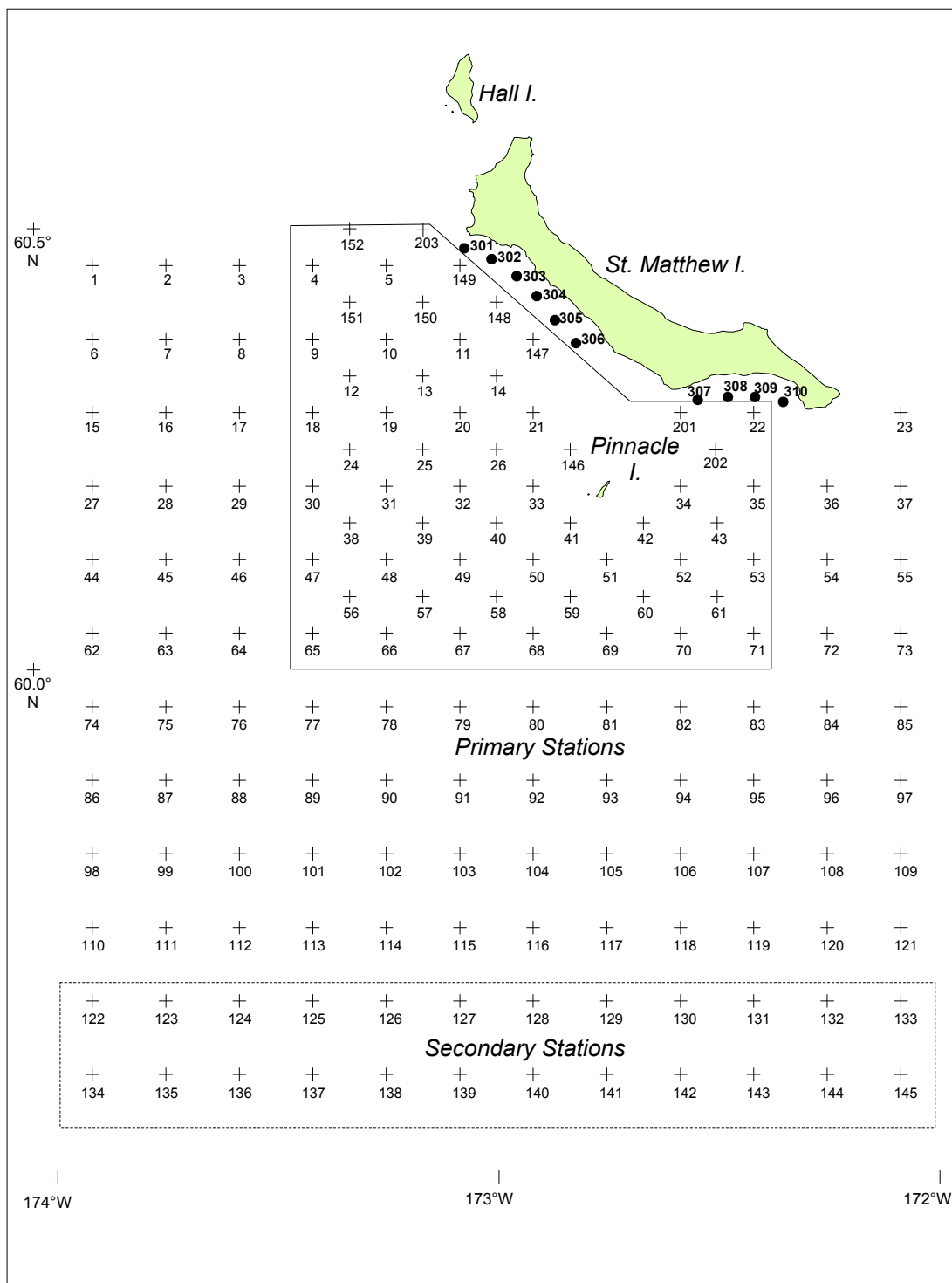


Figure 1. Midpoint locations of the 141 primary and 24 secondary stations to be fished during the 2004 St. Matthew Island blue king crab pot survey. *Stratum 1* stations are outside the polygon, *Stratum 2* stations are within the polygon, and *Stratum 3* stations (shallow-waters) are noted in bold.

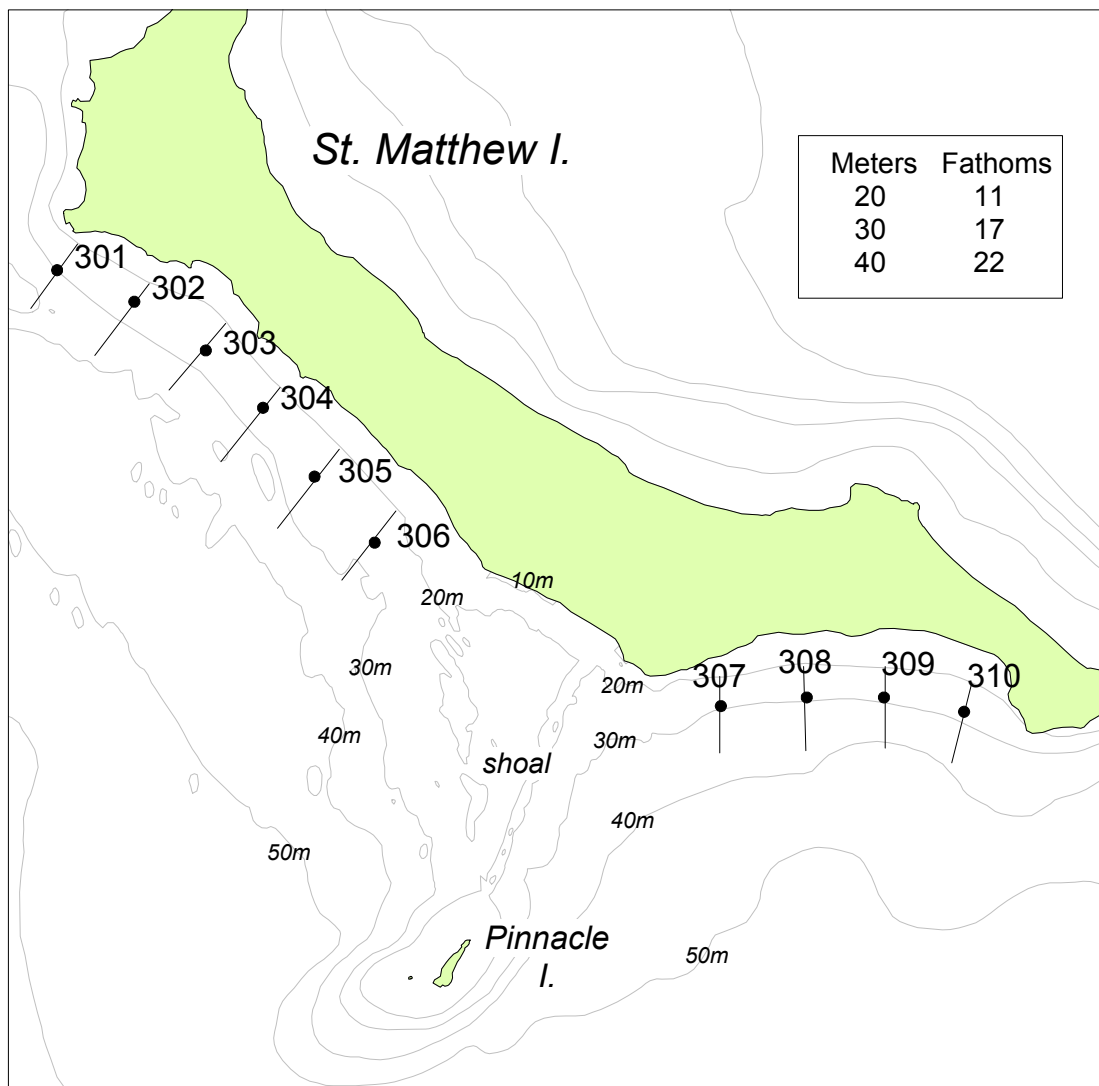


Figure 2. Stratum 3 schematic array with bathymetric background for shallow-water stations (301-310) to be sampled during the 2004 St. Matthew Island pot survey.

APPENDIX

SURVEY ORIENTATION

The purpose of the survey is to safely complete the objectives detailed below

The 2004 survey vessel crew consists of Captain Mike Perry, engineer Kurt Henry, and deckhands Rod Hunter, Scott Pratt, and Chris Howells. Biological staff includes crew leader Leslie Watson, assistant crew leader Rachel Alinsunurin, biologists Susie Byersdorfer and Kirsten Gravel, and technician Amy Gilson.

Safety Briefing

Prior to departure from Dutch Harbor, both vessel and ADF&G crews are required by terms of the charter contract (ITB 2004-1100-4724) to go through the following safety briefings and vessel orientations. The captain will specify all safety features and answer all questions related to these topics.

1. Shipboard Safety Drill: You will be instructed regarding the location(s) to report to and what to do in emergency situations. Specific items include: 1) where to go when the general alarm is pulled; location of life raft(s), skiff(s), survival suits, and EPIRBs 2) safe locations on deck when gear is being set or pulled, dangerous locations on deck during active gear working. A safety drill will be held at an unspecified time to test the ability of all crewmembers and ADF&G personnel to don their survival suits and help others don theirs.
2. General Vessel Orientation: Vessel tour including fire stations, location of medical supplies, etc.

Safety of all personnel and the vessel is the primary concern during the charter. Under international law, the captain is responsible for the safety of the vessel and all souls aboard. Obey the captain in regards to your safety and the safety of others. If you have any doubt at all about where you should be at any time, ask the captain. Avoid running, be careful, and watch out for your own safety and the safety of others. Do not go on deck alone or anywhere outside when seas are extremely rough or conditions are otherwise unsafe; no photos or video are worth the risk. Make sure all deck gear is secured so that the temptation to save gear when it gets wicked out can be precluded. When the gear is being worked, pay attention to the location of lines, buoy trains, boom hooks and other flying objects. Stand in safe locations specified by the captain or deck boss when pots are being set, retrieved, moved or stacked.

Prior to departure, preferably several days before the vessel is scheduled to depart, each ADF&G crew member shall check his/her survival suit, and will wax the zipper and ensure that it works

-Continued-

properly throughout its entire length. Place one large plastic bag at the entrance to each leg hole to ensure a quick donning of your suit if the need arises. Call the U.S. Coast Guard in Dutch Harbor (581-3466) or Kodiak (487-5750) for protocols to test personal EPIRBs. Once tested, secure the EPIRB to your suit. Test the strobe light, make sure it has fresh batteries, and secure it to your suit.

Practice donning your survival suit with a partner while clothed in full rain gear and boots. It is highly advisable that you also practice getting into the suit at a swimming pool prior to going to sea. Your peace of mind at sea will improve immensely if you have practiced and can get into your suit quickly, either on deck or in the water. With adequate practice, you should be able to don your suit in less than 3 minutes. Properly pack and stow your suit.

If you must abandon ship, work with a buddy when getting into your survival suit; ensure that you and your buddy's zippers are up. If possible, secure a line between you and your buddy once you are in the water, but do not tie yourselves together prior to leaving the vessel. Generally, do not abandon ship until the last possible minute, as many boats that appear to be sinking remain afloat. Don't jump into the water unless there is no other option. The approved protocol for jumping off of vessels is described below.

The primary factor controlling your safety at sea is self-preparedness

Protocol for Jumping Off of Vessels (reprinted from Alaska Marine Safety Education Association)

Immersion suit wearers who jump in the water incorrectly can damage their eardrums when air inside a suit rushes into the hood. In addition, damage to one's neck, back, or the suit's zipper can occur when jumping with an inflated air bladder. The diagram below shows the proper way to jump from a height while wearing an immersion suit.



To avoid injury, place the hand farthest from the vessel being abandoned inside the hood or neck of the suit before jumping. This creates a gap between the hood and face that will allow the air in the suit to escape. Once the wearer enters the water, the hydrostatic squeeze of water pressure rapidly forces air from the legs and body of the suit into the hood. The more bulky and loose-fitting the suit, the more likely air will rush into the hood. Without a path for the air to escape, the pressure inside the head can be painful and even damaging to eardrums. This same hand can be used to cover and protect the airway so the jumper does not involuntarily suck in any water through the gasping reflex.

-Continued-

Also, the immersion suit's air bladder should not be inflated if a jump is necessary. If it is, the jumper will come to a sudden and stressful stop once the inflated bladder with all its buoyancy hits the surface of the water. This can result in damage to wearer's neck or back. Damage to the suit's zipper and air bladder can also occur. On some suits the bladder is attached to the zipper, and the force of impact can rip the zipper apart. This damage has occurred even when jumping into the water from a standing position on a dock.

In addition to these two precautions, the jumper should place the hand nearest the vessel atop the hood. This does two things. It protects the side of the head near the vessel from hitting the vessel's side. Also, it keeps the hood in place while entering the water. It is easy for the hood to slip off during entry, especially if the immersion suit is large for the wearer. A well-anchored hood is critically important in preventing water from entering the airway, and in keeping the immersion suit wearer warm while in the water.

Enter the water correctly during training or drills. Learning the correct technique during the nonemergency situation can prevent unnecessary injury during an actual emergency.

Instructions to the Captain

Consult with the crew leader prior to planning the fishing order of the stations and when pots are first picked in the morning and when setting should begin for the following day's pick. Stations are no more than 5 nmi apart and each station consists of 4 king crab pots (supplied by ADF&G). The target soak time for each pot is 30-36 hours. Departures from the soak time goal may occur, but those less than 30 hours or greater than 36 hours are considered unacceptable unless weather conditions preclude sampling within the desired soak time. The primary factor to consider when planning gear-setting strategies is to adhere to the 30-36 hour soak time goal for each pot. An itinerary for completion of survey sampling is in Appendix B.1; stations will be set in 'blocks' of 6 to 8 each day as depicted in Appendix B.2. Changes can be made if bad weather slows or prohibits setting or picking gear, or if crab catches are great. Midpoint locations for each of the 141 primary and 24 secondary stations are listed in Appendix B.3.

Setting and Retrieving Gear. When setting or retrieving gear use the **Pilot House Log** to report all required data for each pot (Appendix D.1). Unique, sequential pot numbers will be assigned for each pot in successive stations beginning with the numeral 1. Record the latitude and longitude to the nearest one-hundredth of a minute; this information must be recorded at the time each pot is set, not at the time it is pulled. Pilot house logs must be accurately completed each day. Please use pencils to record all necessary data.

We will try to stay on a schedule of retrieving the first pot by 0700 hours each day. Notify the ADF&G crew at least 30 minutes before the first pot is pulled in the morning so that we are ready for sampling. As each pot comes aboard, you must tell the ADF&G deck crew what the sequential pot number is for that pot. If a pot is lost, set without bait, or did not fish properly, note that on the Pilot House Log, and inform the ADF&G deck crew. Do not erase the sequential pot number of any lost pot or pot that had a poor performance.

-Continued-

Temperature loggers (CTDs and STRs) will be deployed in five different survey pots and may be switched to other pots in order to sample the range of depths fished. The ADF&G crew will record temperatures by sequential pot number when loggers are retrieved and data are downloaded. Place a checkmark next to the 'Temp (°C)' column to indicate that a temperature logger is in that pot.

Radio and Email Schedules. You will maintain a daily radio schedule between the vessel and it's primary shoreside contact specifying the vessel location. The daily catch log will be reported via email through *Stratos* to the Kodiak and/or Dutch Harbor office, and is the responsibility of the crew leader. That record will contain dates and station numbers fished, and the number of male and female blue king crabs caught. State email use will be limited to necessary communications and the vessel shall be reimbursed for costs associated with State use.

Miscellaneous Shipboard Rules and Reminders

- The captain is responsible for the safety of the vessel and all crew aboard; in such matters, the captain has the authority to halt fishing operations in unsafe or dangerous conditions.
- The crew leader has the authority to delay or halt the charter at any time and for any reason deemed necessary, including but not limited to: unsafe working conditions or insubordination by any person on board.
- Vessel and ADF&G crews will work as a team particularly when sorting the catch. Any personality conflicts will be resolved by the captain and crew leader; should situations arise that could escalate, notify them immediately.
- ADF&G crew must maintain all sampling equipment and ensure that calipers and other sampling equipment are cleaned daily. Store calipers, clipboards, tags, etc., inside the vessel at the end of each sampling day. All sampling gear should be in a designated area out of the mainstream traffic pattern. Ensure that laptop computer(s) and other peripherals are secured at all times. Prior to the end of each day, ADF&G crewmembers will check with the crew leader to ensure that all tasks are completed. Each ADF&G crewmember will be assigned a data checking or tag preparation activity each evening.
- Be considerate of others, maintain a sense of humor, and be patient while onboard the vessel. Keep your living quarters, work areas, and common areas neat. Please wash up thoroughly before meals. Extend offers to assist in meal preparation and dish washing.
- ADF&G crew will be briefed on basic vessel rules, including: 1) where to hang rain gear and gloves, 2) water conservation issues and policies (showers-how often & how long, laundry, dishes, bathroom), 3) galley manners, 4) personnel issues (who's the deck boss, etc.), and other items as noted by the vessel crew.

-Continued-

- When lifting anything, no matter how light it is, bend at the knees, keep your back straight and lift the object using your legs.
- Ensure that all equipment needed for the successful completion of the survey is functional and aboard the vessel prior to departure. Equipment needs are detailed in Appendix C.
- Work hard, play hard. We're going to have a great time in one of the most fantastic places in the Bering Sea. Above all, BE SAFE AND HAVE FUN!

SURVEY DESIGN

Area Coverage, Station Array, and Pot Deployment

The 2004 survey area is between 59°30' - 60°30' N. latitude and 172°00' - 173°55' W. longitude and is composed of 141 primary and up to 24 secondary stations. Primary stations (stations 1-121, 146-152, 201-203, and 301-310) will be fished first and if time permits the secondary stations (122-145) will also be fished. The survey schedule is ambitious; nonetheless, an itinerary has been constructed to meet stated coverage goals (Appendix B.1). Approximately four of the 30 days allotted will be necessary for travel to and from the survey grounds and up to two days for necessary gear preparation.

There are three geographically distinct strata contained in the survey area:

1. Stratum 1 stations are generally south of St. Matthew and offshore from Stratum 2 stations, with a single station density based on a 5 X 5 nmi grid.
2. Stratum 2 stations are closer to the shore, and are based on a grid of stations spaced 5 nmi north-to-south and east-to-west and overlaid with another 5 X 5 nmi grid offset by 2.5 nmi north-to-south and east-to-west.

Each station in Stratum 1 and 2 will consist of 4 pots set 0.125 nmi apart and arrayed either north-to-south or east-to-west, depending on wind conditions.

3. Stratum 3 shallow-water stations are located nearest to shore. Each four-pot station in this stratum will be arrayed 2 nmi from adjacent stations and will be set in a line perpendicular to shore and spaced at 3-fm intervals to sample the 11-20 fm depth range.

Each pot will be baited with one gallon of frozen chopped Pacific herring *Clupea pallasii*. Pots will be pulled in the sequential order that they are set. The target soak time for each pot is 30 to 36 hours. One 'block' of 6 to 8 stations will be set and pulled each day as outlined in Appendix B.2.

-Continued-

Midpoint station locations are listed in Appendix B.3. Fishing parameters such as station and sequential pot number, set date and time, lift date and time, bottom type (rock, sand, silt, mud, or gravel), latitude and longitude, and gear performance will be reported on the **Pilot House Log** Appendix D.1.

Gear Description

Seventy-five identical king crab pots measuring 7' x 7' x 34" supplied by ADF&G will be used. Each pot is webbed with #92 nylon twine with a stretch mesh of 2¾" and has two opposing 8" x 36" tunnel eye openings. Each pot is fitted with one 18" length #30 cotton twine (ADF&G 2003; escape mechanism for shellfish pots). Prior to survey commencement, new pot doors will be affixed to each survey pot.

CATCH SAMPLING

Sorting and Recording Pot Catches

The contents of each pot fished will be enumerated to provide catch per unit effort data for blue king crabs, Tanner crabs *Chionoecetes bairdi*, snow crabs *C. opilio*, and hair crabs *Erimacrus isenbeckii* by sex and size. Blue king crab and snow crab data will be tabulated at the end of each day on the **Station Summary and E-mail Report** (Appendix D.2). The blue king crab summary data will be posted on the email report to D. Pengilly the following morning. All crabs will be handled carefully during sorting and measuring, and will be released immediately after sampling is completed. During release, the vessel will travel at a speed of 5 knots or less to minimize impacts to released crabs. If tagging occurs, the vessel will remain on station (i.e., not moving) until all tagged crabs have been released so that they are released as close to the original capture location as is feasible.

All blue king and hair crabs will be sexed, measured and assessed for shell condition (age). Snow crabs may be subsampled (minimum of 50 crabs per sex per pot) prior to measuring when pot catches are large enough to delay overall survey progress. Other commonly occurring crabs (e.g. arctic lyre crab *Hyas coarctatus*) will be sampled on a time-available basis. Blue king crab and hair crab carapace lengths (CL) will be measured in millimeters (mm) from the posterior margin of the right eye orbit to the midpoint of the rear margin of the carapace as in Wallace et al. (1949). Carapace width (mm CW) of Tanner and snow crabs will be measured across the carapace at the widest part perpendicular to the medial line from the anterior to the posterior of the carapace, with the tips of the calipers reaching inside the lateral spines as shown in Jadamec et al. (1999). Legal size of male blue king (5.5"), hair (3.25"), Tanner (5.5"), and snow (3.1") crabs will be determined by measuring the carapace width outside the lateral spines. Female reproductive condition will be

-Continued-

characterized by clutch fullness, egg color, development and condition (presence of dead eggs). Red king crab *P. camtschaticus* are rarely encountered in this pot survey, but will be sampled and reported as for blue king crabs. Each sampled crab will be documented on the **Crab Survey Data Form** (Appendix D.3).

Captured invertebrates and fish will be identified to species whenever possible, counted and reported on the **Species Composition Form** (Appendix D.4). Total counts of blue king, snow, Tanner and hair crabs will also be recorded on the Species Composition Form for each sampled pot. Commercially important fish species such as Pacific cod *Gadus macrocephalus*, yellowfin sole *Limanda aspera*, Pacific halibut *Hippoglossus stenolepis*, and walleye pollock *Theragra chalcogramma* will be measured in centimeters (cm) from tip of snout to notch of tail (fork length) as time allows (**Fish Length Form**; Appendix D.5).

Shell Aging

Blue King Crabs. The best place to estimate shell age is on the ventral side of the coxa of the walking legs (pereiopods) and meri. Soft-shell crabs are rarely captured in survey pots since they would have had to molt in the pot. Blue king crab shell age parameters are described below; a laminated photo guide will also be used to determine shell age during the survey.

Soft-shell: Crab has molted within weeks. Exoskeleton is still soft from recent molt.

New-shell-pliable: Coxa and ventral surface of exoskeleton shiny, not scratched or pitted. Legs easily compressed when pinched (legs contain little meat at this time). Exoskeleton is fragile and subject to breakage when handled or dumped from the pot. If carapace is removed, the gills will be translucent-cream in color. Crabs estimated to have had new-pliable exoskeletons for approximately two weeks to 3 months after molting.

New-shell-hard: Coxa and ventral surface of exoskeleton dull white. Legs mostly full of meat, meri not easily compressed by pinching. If carapace is removed, the gills will be a light cream color. During August, this category includes most ovigerous females and those with matted setae.

Old-shell: Distal portion of the ventral coxa is partially or totally covered with brown scratches or dots. Legs are full of meat, meri are not easily compressed when pinched. If carapace is removed, gills will be tan in color due to fouling by microorganisms.

Very old-shell: Distal portion of ventral coxa densely covered with black scratches or dots. Legs full of meat, meri not easily compressed when pinched. Carapace is darkened by black spots at the base of spines. Tips of dactyls are worn, rounded, and black. If carapace is removed, gills will be dark gray or gray-black in color due to fouling by microorganisms.

-Continued-

Snow and Tanner Crabs. Shell age will be determined using the parameters outlined in Jadamec et al. (1999).

Hair Crabs. Shell age characteristics for hair crabs are as follows:

New-shell-pliable: Exoskeleton pink. Coxa and ventral surface of exoskeleton shiny, not scratched or pitted. Legs easily compressed when pinched (legs contain little meat at this time). Exoskeleton is fragile and subject to breakage when handled or dumped from the pot. Crabs estimated to have had new-pliable exoskeletons for approximately two weeks to 3 months after molting.

New-shell-hard: Exoskeleton pink. Legs mostly full of meat, meri not easily compressed by pinching.

Old-shell: Crabs with gray or tan cast to exoskeleton, sometimes fouled with marine life, e.g., barnacles.

Clutch Fullness

Clutch fullness categories for female blue king crabs, snow crabs, and Tanner crabs have been modified from the guidelines used on previous pot surveys. Changes described below reflect a move towards standardizing clutch fullness categories using photographic and other descriptive measures. Clutch scores are defined as follows:

Immature

0-Barren, with clean pleopodal setae.

Mature

1-Barren, with matted pleopodal setae.

2-Clutch trace to 1/8 full.

3-Clutch $\frac{1}{4}$ full.

4-Clutch $\frac{1}{2}$ full.

5-Clutch $\frac{3}{4}$ full.

6-Clutch 100% full.

King crab clutch categories and codes are depicted in Appendix E.1. Snow and Tanner crab clutch scoring and coding is shown in Appendix E.2.

Contingency Plan for Tagging

Based on the 2003 NMFS eastern Bering Sea trawl survey results and the current depressed status of the St. Matthew Island blue king crab stock, it is unlikely that the commercial fishery for blue king crabs will open in 2004. The fishery threshold for St. Matthew Island blue king crab is 11.0

-Continued-

million pounds of total mature biomass. In 2003, the stock was above the fishery threshold but the guideline harvest level determined by the management strategy was below the minimum allowed for a fishery opening. For these reasons, it is not anticipated that a tagging program will be instituted within the 2004 pot survey. However, if catches from the NMFS 2004 trawl survey, which concludes about the same time as the pot survey begins, indicate that conditions warrant a fishery, a tagging study may be conducted as described below.

A maximum of 30 legal and 30 sublegal (>90 mm CL) healthy male blue king crabs will be tagged and released at each station in Stratum 1 and 2. Each crab will be healthy, with no severe new or old injuries or parasitic infestations. The first 30 crabs of each size class (legal and sublegal) in each station that meet the tagging criteria will be tagged. If 30 eligible crabs are found in the first pot of a station, those 30 will be tagged, regardless of the number available in the remaining 3 pots of that station. Crabs will be tagged through the isthmus muscle using Floy® poly 'spaghetti' tags as described in Gray (1965); the tags are fluorescent pink with fluorescent green tabs and are numbered 'K' 7,801 through 'K' 15,000.

Tagged Crab Recoveries. Captures of tagged blue king crabs from the 1998 and 2001 tagging surveys will be sampled as described above and released alive with tag intact. All recovery information (sex, size, shell condition, recapture location, and reproductive data) will be recorded on the **Tagged Crab Recovery Form** (Appendix D.6).

Daily Data Checking. Each day data is collected it will be checked for accuracy by crosschecking recorded data by a person other than the recorder. This includes all forms that have been used that day (e.g., Pilot House Log, Crab Survey Data form, Species Composition form).

OTHER SHIPBOARD PROJECTS

Blue King Crab Food Habits

Approximately 100 blue king crab stomach samples will be collected from pot catches. The entire intestinal tract from the esophagus to the end of the hindgut will be excised and the hindgut secured by tying a knot near the lower end. Samples will be preserved in 10% formalin buffered with seawater and stored individually in specimen jars. Location, date, sex, and carapace size (mm CL) of preserved stomachs from sampled crabs will be recorded on the **Crab Stomach Sample Log** (Appendix D.7) and on labels affixed to the outside of each jar. Data and samples will be returned to R. Gish in Kodiak at completion of the survey.

-Continued-

Ocean Temperature Data

Ocean bottom temperature data (°C) will be collected from select pots to sample the depth range fished within the survey grid. Three Brancker® model XR-420 conductivity-temperature-depth (CTD) and two Brancker® model TR-1000 submersible temperature recorder (STR) data loggers will be deployed daily to obtain temperature data concurrent to blue king crab catch per pot data. Temperature data from sampled pots will be recorded on the Pilot House Log after the logger is retrieved and the data are downloaded. All logger deployments will be documented on the **Temperature Data Log** (Appendix D.8).

Chionoecetes Specimen Collection

K. Gravel will coordinate the at-sea collections for this project. Collections will be made within the course of daily survey pot sampling. Complete sampling protocols are detailed in Appendix F.

Photographic Guide

S. Byersdorfer will be in charge of at-sea photography for the photographic guide. Specialized photographic efforts are not to impede daily survey pot sampling progress.

Fish Skeletal Comparative Collection

R. Alinsunurin will be responsible for this collection at-sea and when the survey vessel returns to Dutch Harbor. A description of the project and an itemized list are in Appendix G.

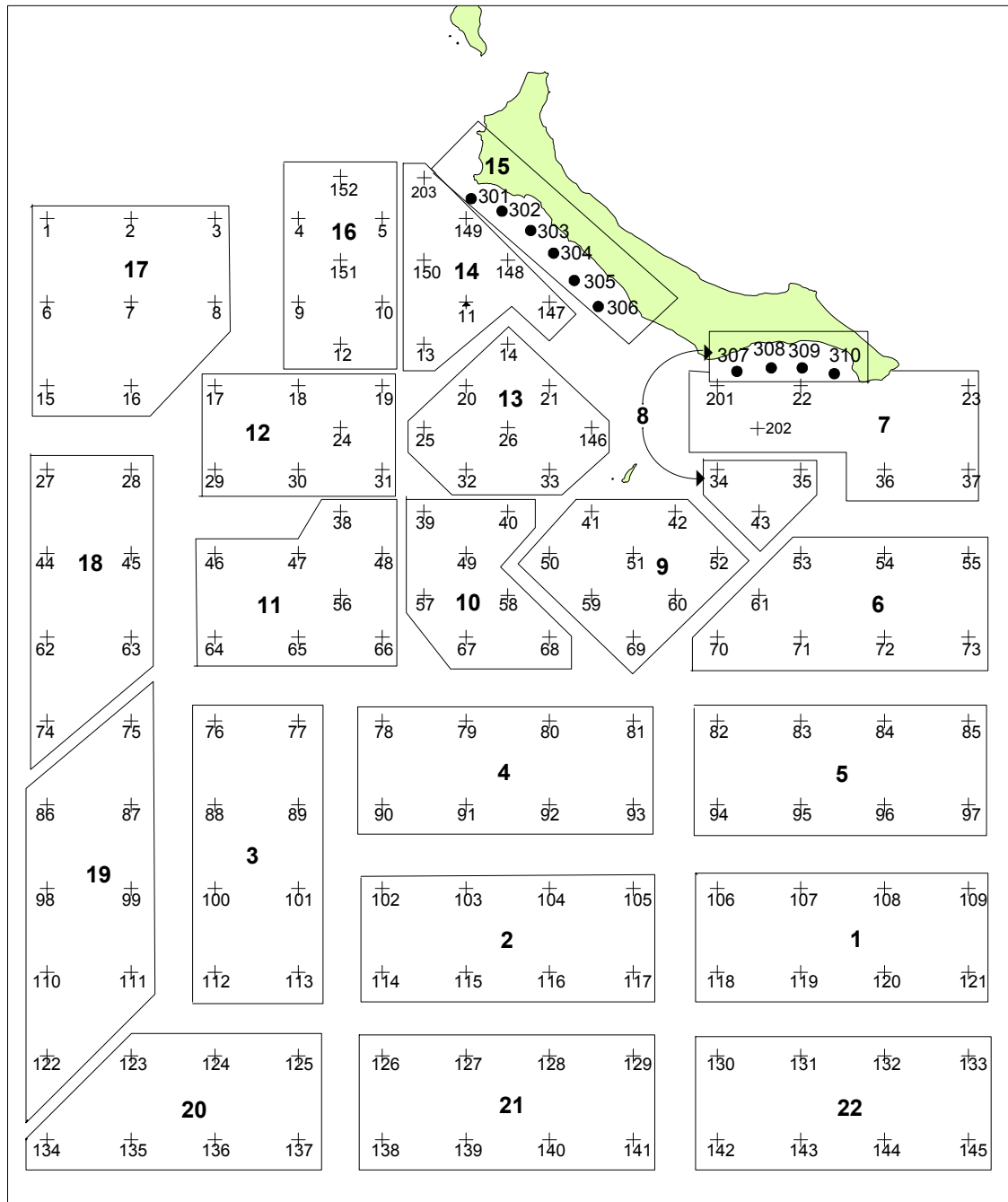
LITERATURE CITED

- Alaska Department of Fish and Game (ADF&G). 2003. Regulations of the Alaska Board of Fisheries for statewide commercial shellfish fishing in Alaska, 2003 – 2005 edition, Juneau, 230 pp.
- Gray, G.W., Jr. 1965. Tags for marking king crabs. *Progr. Fish.-Cult.* 27: 221-227.
- Jadamec, L.S., W.E. Donaldson, and P. Cullenberg. 1999. Biological field techniques for *Chionoecetes* crabs. University of Alaska Sea Grant College Program Report AK-SG-99-02, Fairbanks.
- Wallace, M.M., C.J. Pertuit, and A.R. Hvatum. 1949. Contribution to the biology of the king crab (*Paralithodes camtschatica*) Tilesius. U. S. Department of the Interior, Fish and Wildlife Service, Fishery Leaflet No. 340.
-

Appendix B.1. Itinerary for the 2004 St. Matthew Island blue king crab pot survey.

| Day No. | Date | Activity | | Stations Set |
|---------|------|---|---------------|--------------|
| July | | | | |
| 1 | 24 | Load survey gear and prepare pots | - | - |
| 2 | 25 | Continue gear prep; travel to survey grounds | - | - |
| 3 | 26 | Travel to survey grounds | - | - |
| 4 | 27 | Set Block 1 stations: 106, 107, 108, 109, 118, 119, 120, 121 | - | 8 |
| 5 | 28 | Set Block 2 stations: 102, 103, 104, 105, 114, 115, 116, 117 | - | 8 |
| 6 | 29 | Set Block 3 stations: 76, 77, 88, 89, 100, 101, 112, 113 | Pick Block 1 | 8 |
| 7 | 30 | Set Block 4 stations: 78, 79, 80, 81, 90, 91, 92, 93 | Pick Block 2 | 8 |
| 8 | 31 | Set Block 5 stations: 82, 83, 84, 85, 94, 95, 96, 97 | Pick Block 3 | 8 |
| August | | | | |
| 9 | 1 | Set Block 6 stations: 53, 54, 55, 61, 70, 71, 72, 73 | Pick Block 4 | 8 |
| 10 | 2 | Set Block 7 stations: 22, 23, 36, 37, 201, 202 | Pick Block 5 | 6 |
| 11 | 3 | Set Block 8 stations: 34, 35, 43, 307, 308, 309, 310 | Pick Block 6 | 7 |
| 12 | 4 | Set Block 9 stations: 41, 42, 50, 51, 52, 59, 60, 69 | Pick Block 7 | 8 |
| 13 | 5 | Set Block 10 stations: 39, 40, 49, 57, 58, 67, 68 | Pick Block 8 | 7 |
| 14 | 6 | Set Block 11 stations: 38, 46, 47, 48, 56, 64, 65, 66 | Pick Block 9 | 8 |
| 15 | 7 | Set Block 12 stations: 17, 18, 19, 24, 29, 30, 31 | Pick Block 10 | 7 |
| 16 | 8 | Set Block 13 stations: 14, 20, 21, 25, 26, 32, 33, 146 | Pick Block 11 | 8 |
| 17 | 9 | Set Block 14 stations: 11, 13, 147, 148, 149, 150, 203 | Pick Block 12 | 7 |
| 18 | 10 | Set Block 15 stations: 301, 302, 303, 304, 305, 306 | Pick Block 13 | 6 |
| 19 | 11 | Set Block 16 stations: 4, 5, 9, 10, 12, 151, 152 | Pick Block 14 | 7 |
| 20 | 12 | Set Block 17 stations: 1, 2, 3, 6, 7, 8, 15, 16 | Pick Block 15 | 8 |
| 21 | 13 | Set Block 18 stations: 27, 28, 44, 45, 62, 63, 74 | Pick Block 16 | 7 |
| 22 | 14 | Set Block 19 stations: 75, 86, 87, 98, 99, 110, 111, 122 | Pick Block 17 | 8 |
| 23 | 15 | Set Block 20 stations: 123, 124, 125, 134, 135, 136, 137 | Pick Block 18 | 7 |
| 24 | 16 | Set Block 21 stations: 126, 127, 128, 129, 138, 139, 140, 141 | Pick Block 19 | 8 |
| 25 | 17 | Set Block 22 stations: 130, 131, 132, 133, 142, 143, 144, 145 | Pick Block 20 | 8 |
| 26 | 18 | - | Pick Block 21 | - |
| 27 | 19 | - | Pick Block 22 | - |
| 28 | 20 | Allocated weather day | | |
| 29 | 21 | Travel to Dutch Harbor | | |
| 30 | 22 | Arrive Dutch Harbor and offload survey gear | | |

Appendix B.2. Layout of the 22 station blocks to be fished during the 2004 St. Matthew Island blue king crab pot survey.



Appendix B.3. Midpoint locations of the 141 primary and 24 secondary stations to be fished during the 2004 St. Matthew Island blue king crab survey.

| Station | Stratum | N. Latitude | W. Longitude |
|---------|---------|-------------|--------------|
| 1 | 1 | 60.4583 | 173.9170 |
| 2 | 1 | 60.4583 | 173.7500 |
| 3 | 1 | 60.4583 | 173.5830 |
| 4 | 2 | 60.4583 | 173.4170 |
| 5 | 2 | 60.4583 | 173.2500 |
| 6 | 1 | 60.3750 | 173.9170 |
| 7 | 1 | 60.3750 | 173.7500 |
| 8 | 1 | 60.3750 | 173.5830 |
| 9 | 2 | 60.3750 | 173.4170 |
| 10 | 2 | 60.3750 | 173.2500 |
| 11 | 2 | 60.3750 | 173.0830 |
| 12 | 2 | 60.3333 | 173.3330 |
| 13 | 2 | 60.3333 | 173.1670 |
| 14 | 2 | 60.3333 | 173.0000 |
| 15 | 1 | 60.2917 | 173.9170 |
| 16 | 1 | 60.2917 | 173.7500 |
| 17 | 1 | 60.2917 | 173.5830 |
| 18 | 2 | 60.2917 | 173.4170 |
| 19 | 2 | 60.2917 | 173.2500 |
| 20 | 2 | 60.2917 | 173.0830 |
| 21 | 2 | 60.2917 | 172.9170 |
| 22 | 2 | 60.2917 | 172.4170 |
| 23 | 1 | 60.2917 | 172.0830 |
| 24 | 2 | 60.2500 | 173.3330 |
| 25 | 2 | 60.2500 | 173.1670 |
| 26 | 2 | 60.2500 | 173.0000 |
| 27 | 1 | 60.2083 | 173.9170 |
| 28 | 1 | 60.2083 | 173.7500 |
| 29 | 1 | 60.2083 | 173.5830 |
| 30 | 2 | 60.2083 | 173.4170 |
| 31 | 2 | 60.2083 | 173.2500 |
| 32 | 2 | 60.2083 | 173.0830 |
| 33 | 2 | 60.2083 | 172.9170 |
| 34 | 2 | 60.2083 | 172.5830 |
| 35 | 2 | 60.2083 | 172.4170 |
| 36 | 1 | 60.2083 | 172.2500 |
| 37 | 1 | 60.2083 | 172.0830 |
| 38 | 2 | 60.1667 | 173.3330 |
| 39 | 2 | 60.1667 | 173.1670 |
| 40 | 2 | 60.1667 | 173.0000 |
| 41 | 2 | 60.1667 | 172.8330 |

-Continued-

Appendix B.3. (page 2 of 4)

| Station | Stratum | N. Latitude | W. Longitude |
|---------|---------|-------------|--------------|
| 42 | 2 | 60.1667 | 172.6670 |
| 43 | 2 | 60.1667 | 172.5000 |
| 44 | 1 | 60.1250 | 173.9170 |
| 45 | 1 | 60.1250 | 173.7500 |
| 46 | 1 | 60.1250 | 173.5830 |
| 47 | 2 | 60.1250 | 173.4170 |
| 48 | 2 | 60.1250 | 173.2500 |
| 49 | 2 | 60.1250 | 173.0830 |
| 50 | 2 | 60.1250 | 172.9170 |
| 51 | 2 | 60.1250 | 172.7500 |
| 52 | 2 | 60.1250 | 172.5830 |
| 53 | 2 | 60.1250 | 172.4170 |
| 54 | 1 | 60.1250 | 172.2500 |
| 55 | 1 | 60.1250 | 172.0830 |
| 56 | 2 | 60.0833 | 173.3330 |
| 57 | 2 | 60.0833 | 173.1670 |
| 58 | 2 | 60.0833 | 173.0000 |
| 59 | 2 | 60.0833 | 172.8330 |
| 60 | 2 | 60.0833 | 172.6670 |
| 61 | 2 | 60.0833 | 172.5000 |
| 62 | 1 | 60.0417 | 173.9170 |
| 63 | 1 | 60.0417 | 173.7500 |
| 64 | 1 | 60.0417 | 173.5830 |
| 65 | 2 | 60.0417 | 173.4170 |
| 66 | 2 | 60.0417 | 173.2500 |
| 67 | 2 | 60.0417 | 173.0830 |
| 68 | 2 | 60.0417 | 172.9170 |
| 69 | 2 | 60.0417 | 172.7500 |
| 70 | 2 | 60.0417 | 172.5830 |
| 71 | 2 | 60.0417 | 172.4170 |
| 72 | 1 | 60.0417 | 172.2500 |
| 73 | 1 | 60.0417 | 172.0830 |
| 74 | 1 | 59.9583 | 173.9170 |
| 75 | 1 | 59.9583 | 173.7500 |
| 76 | 1 | 59.9583 | 173.5830 |
| 77 | 1 | 59.9583 | 173.4170 |
| 78 | 1 | 59.9583 | 173.2500 |
| 79 | 1 | 59.9583 | 173.0830 |
| 80 | 1 | 59.9583 | 172.9170 |
| 81 | 1 | 59.9583 | 172.7500 |
| 82 | 1 | 59.9583 | 172.5830 |
| 83 | 1 | 59.9583 | 172.4170 |

-Continued-

Appendix B.3. (page 3 of 4)

| Station | Stratum | N. Latitude | W. Longitude |
|---------|---------|-------------|--------------|
| 84 | 1 | 59.9583 | 172.2500 |
| 85 | 1 | 59.9583 | 172.0830 |
| 86 | 1 | 59.8750 | 173.9170 |
| 87 | 1 | 59.8750 | 173.7500 |
| 88 | 1 | 59.8750 | 173.5830 |
| 89 | 1 | 59.8750 | 173.4170 |
| 90 | 1 | 59.8750 | 173.2500 |
| 91 | 1 | 59.8750 | 173.0830 |
| 92 | 1 | 59.8750 | 172.9170 |
| 93 | 1 | 59.8750 | 172.7500 |
| 94 | 1 | 59.8750 | 172.5830 |
| 95 | 1 | 59.8750 | 172.4170 |
| 96 | 1 | 59.8750 | 172.2500 |
| 97 | 1 | 59.8750 | 172.0830 |
| 98 | 1 | 59.7917 | 173.9170 |
| 99 | 1 | 59.7917 | 173.7500 |
| 100 | 1 | 59.7917 | 173.5830 |
| 101 | 1 | 59.7917 | 173.4170 |
| 102 | 1 | 59.7917 | 173.2500 |
| 103 | 1 | 59.7917 | 173.0830 |
| 104 | 1 | 59.7917 | 172.9170 |
| 105 | 1 | 59.7917 | 172.7500 |
| 106 | 1 | 59.7917 | 172.5830 |
| 107 | 1 | 59.7917 | 172.4170 |
| 108 | 1 | 59.7917 | 172.2500 |
| 109 | 1 | 59.7917 | 172.0830 |
| 110 | 1 | 59.7083 | 173.9170 |
| 111 | 1 | 59.7083 | 173.7500 |
| 112 | 1 | 59.7083 | 173.5830 |
| 113 | 1 | 59.7083 | 173.4170 |
| 114 | 1 | 59.7083 | 173.2500 |
| 115 | 1 | 59.7083 | 173.0830 |
| 116 | 1 | 59.7083 | 172.9170 |
| 117 | 1 | 59.7083 | 172.7500 |
| 118 | 1 | 59.7083 | 172.5830 |
| 119 | 1 | 59.7083 | 172.4170 |
| 120 | 1 | 59.7083 | 172.2500 |
| 121 | 1 | 59.7083 | 172.0830 |
| 122 | 1 | 59.6250 | 173.9170 |
| 123 | 1 | 59.6250 | 173.7500 |
| 124 | 1 | 59.6250 | 173.5830 |
| 125 | 1 | 59.6250 | 173.4170 |

-Continued-

Appendix B.3. (page 4 of 4)

| Station | Stratum | N. Latitude | W. Longitude |
|---------|---------|-------------|--------------|
| 126 | 1 | 59.6250 | 173.2500 |
| 127 | 1 | 59.6250 | 173.0830 |
| 128 | 1 | 59.6250 | 172.9170 |
| 129 | 1 | 59.6250 | 172.7500 |
| 130 | 1 | 59.6250 | 172.5830 |
| 131 | 1 | 59.6250 | 172.4170 |
| 132 | 1 | 59.6250 | 172.2500 |
| 133 | 1 | 59.6250 | 172.0830 |
| 134 | 1 | 59.5417 | 173.9170 |
| 135 | 1 | 59.5417 | 173.7500 |
| 136 | 1 | 59.5417 | 173.5830 |
| 137 | 1 | 59.5417 | 173.4170 |
| 138 | 1 | 59.5417 | 173.2500 |
| 139 | 1 | 59.5417 | 173.0830 |
| 140 | 1 | 59.5417 | 172.9170 |
| 141 | 1 | 59.5417 | 172.7500 |
| 142 | 1 | 59.5417 | 172.5830 |
| 143 | 1 | 59.5417 | 172.4170 |
| 144 | 1 | 59.5417 | 172.2500 |
| 145 | 1 | 59.5417 | 172.0830 |
| 146 | 2 | 60.2500 | 172.8330 |
| 147 | 2 | 60.3750 | 172.9170 |
| 148 | 2 | 60.4167 | 173.0000 |
| 149 | 2 | 60.4583 | 173.0830 |
| 150 | 2 | 60.4167 | 173.1670 |
| 151 | 2 | 60.4167 | 173.3330 |
| 152 | 2 | 60.5000 | 173.3330 |
| 201 | 2 | 60.2917 | 172.5830 |
| 202 | 2 | 60.2492 | 172.5028 |
| 203 | 2 | 60.4986 | 173.1665 |
| 301 | 3 | 60.4779 | 173.0730 |
| 302 | 3 | 60.4654 | 173.0114 |
| 303 | 3 | 60.4462 | 172.9544 |
| 304 | 3 | 60.4236 | 172.9088 |
| 305 | 3 | 60.3965 | 172.8677 |
| 306 | 3 | 60.3705 | 172.8198 |
| 307 | 3 | 60.3061 | 172.5439 |
| 308 | 3 | 60.3095 | 172.4755 |
| 309 | 3 | 60.3095 | 172.4139 |
| 310 | 3 | 60.3038 | 172.3500 |

Appendix C. Equipment list.

EQUIPMENT FOR EACH ADFG CREWMEMBER

1. Survival suit with attached EPIRB, strobe and water-activated light
2. Rain gear, boots, gloves
3. Stormy Seas jacket
4. SOSpenders

DECK AND SAMPLING EQUIPMENT

1. One 4'x8' aluminum sorting table with 6 stands
2. (12) thin, 3" hex head bolts and appropriate sized socket wrench for table assembly
3. (4) regular size clipboards
4. (4) covered clipboards (aluminum or plastic)
5. (6) pair calipers, large size with millimeter scale
6. (6) 5.5# measuring sticks (BKC & Tanners)
7. (3) tape measures – in cms (halibut and other fish)
8. (1) fish measuring board
9. (2) cans WD-40
10. (4) dump totes
11. (15) fish baskets
12. (4) plastic Rubbermaid dishpans
13. Assorted plastic bags: gallon & quart zip-locks
14. (10) rolls electric tape
15. (3) liters of 100% formalin w/ mixing jar
16. (1) gallon alcohol
17. (100) specimen jars
18. (1 or 2?) dissecting kit
19. (6) Victorinox knives
20. Plastic toolbox for crab sampling equipment
21. (2 or 3?) assorted magnifying glasses
22. (2) rolls biodegradable cotton twine
23. 5 lbs #96 tarred seine twine
24. 5 lbs 5mm poly orange twine

TAGGING SUPPLIES

1. (~7,500) Floy tags-(Aleutian Islands 2003 leftovers 'K' 7,801 – 'K' 15,000)
2. Tagging needles & sharpening file
3. (10) tagging rods

FORMS

1. 50 pilot house log forms
2. 50 station catch summary and email report
3. 2000 crab survey data forms (rite-in-rain paper)
4. 250 species composition forms (rite-in-rain paper)
5. 100 fish length forms (rite-in-rain paper)
6. 10 tag recovery forms
7. 10 crab stomach sample forms
8. 10 temperature data forms

-Continued-

CHARTS AND BOOKS

1. (1) NOAA St. Matthew NOS NP-2-7 bathymetric chart
2. (1) 2003-2005 Commercial Shellfish Fishing Regulations
3. ADF&G BKC survey reports and operational plans (1995, 1998, 1999, and 2001)
4. 2004 NMFS Species Codebook (1)
5. 2003 NMFS EBS survey report (1)
6. Ranked species list for NMFS 2003 EBS trawl survey (1)
7. Checklist of Alaskan Crabs, Stevens 2002 (1)
8. Review of the Family Lithodidae, Zaklan 2002 (1)
9. Biological Field Techniques for Chionoecetes Crabs, Jadamec et al. 1999 (2)
10. Laminated shell age guide for *P. platypus* (from S. Byersdorfer, pers. comm.) (2)
11. Laminated NMFS clutch fullness guide for *C. opilio* (from K. Gravel pers. comm.) (2)
12. Alaska Saltwater Fishes and Other Sea Life, Kessler 1985 (2)
13. Under Alaskan Seas, Barr and Barr 1983 (2)
14. NMFS Invert guide *Eastern Bering Sea*, Clark (undated) (1)
15. NMFS Invert guide *Gulf of Alaska*, Clark 1999 (1)
16. Guide to the Identification of some Common eastern Bering Sea Snails, MacIntosh 1976 (2)
17. Pribilof Field Guide, Byersdorfer 2004 (1)
18. Illustrated Key to west North American Pelecypod genera, Keen & Frizzel 1946 (1)
19. Illustrated Key to west North American Gastropod genera, Keen & Pearson 1952 (1)
20. Names of Decapod Crustaceans AFS #17, Williams et al. 1989 (1)
21. Names of Mollusks AFS #16, Turgeon et al. 1988 (1)
22. Pacific Fishes of Canada, Hart 1973 (1)
23. Fishes of Alaska, Mecklenburg et al. date (1)
24. Guide to northeast Pacific Flatfishes, Kramer et al. 1995 (1)
25. Guide to northeast Pacific Rockfishes, Kramer & O'Connell 1986 (1)

OFFICE AND MISC. SUPPLIES

1. (2) crew leader notebooks (3-ring binders)
2. (2) calculators
3. (10) mechanical pencils
4. Pkg. Number 2 regular pencils
5. (5) ink pens
6. Permanent markers
7. Highlighting markers
8. (100) sheets plain paper
9. (50) sheets Rite-in-Rain paper
10. (4) rite-in-rain field notebooks
11. (20) earplugs
12. 3-ring hole punch
13. Ass't. rubber bands (large for clipboards)
14. (1) roll Scotch & (2) rolls duct tape
15. Ass't. paper & binder clips
16. (15) envelopes (data form filing)
17. North Star medical kit (updated)
18. (1) 25-ft power cord

-Continued-

COMPUTERS, CAMERAS, AND PERIPHERALS

1. (2) notebook computers with power cords
2. (2) Buss bars
3. (5) zip disks
4. Olympus digital camera
 - computer hookup cable
 - (2) 128 mg cards
 - charger and rechargeable batteries (type?)

TEMPERATURE RECORDERS

Conductivity-Temperature-Depth Recorders (CTDs) Brancker Model XR-420 (large, titanium housing)

1. Three units:
 - S/N 9616
 - S/N 9641
 - S/N 9643
2. (2) RS232 cables (telephone plug on one end, serial port connector on the other end)
3. (1) software disk (version 4.10 or 4.18)
4. (1) operations manual
5. (3) fresh sets of batteries: each CTD uses four (4), 3V lithium cells (e.g. Energizer EL123A, Duracell DL123A)

Submersible Temperature Recorders (STRs) Brancker Model TR-1000 (small, yellow housing)

STRs will be programmed in Kodiak by R. Shepard prior to deployment on the 2004 survey. The programming software for the STRs uses Windows95; that version is not compatible with the survey laptops therefore these recorders cannot be programmed or downloaded at sea.

1. Two units:
 - S/N 7209
 - S/N 8429
 2. (2) fresh sets of batteries: each STR uses one (1) "D" cell
-

Appendix D.1. Pilot House Log.

ADF&G PILOT HOUSE LOG - 2004 ST. MATTHEW BLUE KING CRAB SURVEY

CAPTAIN:

VESSEL: FV

PG _____ OF _____

| STATION | | | SET GEAR | | | DEPTH (FM) | | | Bot. Type | SEQUENTIAL POT NUMBER | | | BUOY NO. | LIFT GEAR | | | N. LATITUDE | | W. LONGITUDE | | Gear | Tem | |
|---------|--|--|----------|-----|---------------|---------------|--|--|--------------|--------------------------|--|--|-------------|-----------|-----|---------------|-------------|---------|--------------|---------|-------|-------|---|
| | | | MONTH | DAY | MILITARY TIME | | | | | | | | | MONTH | DAY | MILITARY TIME | DEG. | MINUTES | DEG. | MINUTES | Perf. | ("C") | |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| STATION | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| STATION | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| STATION | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | . | | | . | | | . |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |
| | | | | | | | | | | | | | | | | | | | . | | | . | |

BOTTOM TYPE:

BOTTOM TYPE:
1-Rock 4-Mud
2-Sand 5-Gravel
3-Silt

GEAR PERFORMANCE:

blank-Pot performance satisfactory 22-Pot not baited
20-Lost pot 23-Pot not set
21-Pot malfunction: loss of catch observed
due to bent/untied door

COMMENTS:

[D:\STMATT\STMATT04\FORMS2004.XLS: SMLOG04 LJW 4/2004]

-Continued-

INSTRUCTIONS FOR PILOT HOUSE LOG

This form is used to record fishing parameters for every pot that is set during the survey. It is the definitive table in the survey database and must be accurately completed.

STATION – The station number of the pots set as identified from Figure A.1.

SET GEAR – Record the month, day, and military time (24-hour) the pot is set.

DEPTH – Record pot depth in fathoms.

BOTTOM TYPE – Record the bottom type according to vessel echo sounder readings using the codes on the Pilot House Log form.

SEQUENTIAL POT NUMBER – Enter each sequentially numbered survey pot at the time it is set, beginning with the number 1. Sequential pot numbering will not change if a pot is lost, if it is unbaited or malfunctions in any way.

BUOY NUMBER – Record the buoy number of each pot set. In addition to standard fishing practice, the buoy number is used to identify pots during sampling by the scientific crew on deck. *This field is not entered in the database.*

LIFT GEAR - Record the month, day, and military time (24-hour) the pot is retrieved. If a pot is lost, write 'LOST POT' across this row.

N. LATITUDE AND W. LONGITUDE – Record each pot location at the time it is set, in degrees, minutes and hundredths of minutes, e.g. 59°32.86 N. latitude, 172°57.23' W. longitude.

GEAR PERFORMANCE – Leave blank if pot performance is satisfactory. Record appropriate gear performance codes as noted on the Pilot House Log.

TEMPERATURE – Temperature recorders will be placed in select pots to measure ocean floor temperatures across the depth range of surveyed stations. Temperature data (°C) will be entered in the Pilot House log when recorders are retrieved and downloaded.

Appendix D.2. Station Summary and E-mail Report.

BLUE KING CRAB
ADF&G STATION SUMMARY AND EMAIL REPORT

PG ____ OF ____

| | | MALES | | | | FEMALES | | COMMENTS |
|---------|--------------------------|-----------------------|---------------------|------------------------------------|--------------------|----------|--------|----------|
| STATION | SEQUENTIAL POT NUMBER | PREREC. (90-119mm) | MATURE (> 104mm) | RECRUIT newshell (120-133mm) | LEGAL (> 119mm) | Immature | Mature | |
| STATION | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| STATION | TOTALS | | | | | | | |
| TOTALS | | | | | | | | |

[D:\STMATT\STMATT04\FORMS2004.XLS: BKCSTATSUM04 LJV 4/2004]

-Continued-

**SNOW CRAB
STATION SUMMARY AND EMAIL REPORT**

PG ____ OF ____

| | | MALES | | | | FEMALES | | COMMENTS |
|-------------------------|--------------------------|----------------------|----------------------|---------------------|----------------|----------|--------|----------|
| STATION | SEQUENTIAL POT NUMBER | SUBLEGAL (<79 mm) | LEGAL (79-101 mm) | LEGAL (> 101 mm) | TOTAL LEGAL | Immature | Mature | |
| STATION [][][][] | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION [][][][] | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION [][][][] | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION [][][][] | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION [][][][] | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| STATION | TOTALS | | | | | | | |
| STATION [][][][] | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| | [][][][] | | | | | | | |
| STATION | TOTALS | | | | | | | |
| TOTALS | | | | | | | | |

[D:\STMATT\STMATT04\FORMS2004.XLS: COSTATSUM04 LJW 4/2004]

-Continued-

INSTRUCTIONS FOR STATION SUMMARY AND EMAIL REPORT

These forms are used to summarize station catches by sex and size or maturity class for blue king and snow crabs. Only blue king crab data will be reported daily via email to ADF&G in Kodiak and/or Dutch Harbor. Compute and record data as outlined below. If subsampling has occurred, ensure that the totals reflect values after adjusting for the sampling fraction (see instructions for the Crab Survey Data Form).

STATION – Same number as recorded on the Pilot House Log.

SEQUENTIAL POT NUMBER – Same number as recorded on the Pilot House Log.

BLUE KING CRABS

PREREC. (90-119 mm) – males 90-119 mm CL.

MATURE (≥ 105 mm) – males ≥ 105 mm CL.

RECRUIT NEWSHELL (120-133 mm) – new-shell males 120 – 133 mm CL.

LEGAL – males ≥ 120 mm CL

IMMATURE FEMALE – no evidence of ovigerity.

MATURE FEMALE – evidence of ovigerity.

SNOW CRABS

SUBLEGAL (<79 mm) – males <79 mm CW inside lateral spines.

LEGAL (79 - 101 mm) – males 79-101 mm CW inside lateral spines.

LEGAL (> 101 mm) – males > 101 mm CW inside lateral spines.

TOTAL LEGAL – males ≥ 79 mm CW inside lateral spines.

IMMATURE FEMALE – defined by size and shape of abdominal flap (Jadamec et al. 1999).

MATURE FEMALE – defined by size and shape of abdominal flap (Jadamec et al. 1999).

[illegible]

| Crab Species | | Shell | Live Embryo | Embryo Development | Percent Clutch | Other | |
|-------------------|-------------------|---------------|----------------|---|----------------------------|---------------------------------|-----------------------|
| 1-L.aequispinus | 7-C.opilio | 0-soft | Color | 1-eyed | 0-barren, clean setae | 1-dead | |
| 2-P.camtschaticus | 8-C. angulatus | 9-new/pliable | 1-tan | 2-uneys | 1-barren, matted setae | 3-nemerteans in clutch | |
| 3-P.platypus | 9-C. magister | 1-new/hard | 2-purple | 3-hatching (<1/4 clutch and matted setae) | 2-clutch trace to 1/8 full | 4-turbellarians in clutch | |
| 4-E.isenbeckii | 10-L. couesi | 2-old | 3-brown | | 3-clutch 1/4 full | 5-black mat | 6-bitter crab disease |
| 5-Tanner hybrid | 11-C. tanneri | 3-very old | 4-orange | | 4-clutch 1/2 full | 7-"cottage cheese" disease | |
| 6-C.bairdi | 12-P. multispinus | | 5-purple/brown | Embryo Condition | 5-clutch 3/4 full | 8-shell disease ("torch"/rust) | |
| | | | 6-pink | 1-dead eggs not apparent | 6-clutch 100% full | 9-B. callosus | 0-leatherback |
| Sex | | Legal | | | | | |
| 1-male | 3-hemaphrodite | 1-Legal | 3-immat. | 7-reddish | 2-dead eggs <20% | 10-snaifish eggs under carapace | |
| 2-female | blank-sex unk. | 2-Subleg. | 4-mature | 0-other (describe) | 3-dead eggs >20% | 11-deformed carapace or gills | |

INSTRUCTIONS FOR CRAB SURVEY DATA FORM

This form is used to record all captured blue king, hair, Tanner, and snow crabs captured on the survey. Leading zeroes are only used in date entries. Do not record sequential pot numbers for pots that have no crab catch. If a sampled crab is unmeasurable (deformed or broken carapace), leave size blank and record remaining data. Collect, label, and freeze any hermaphroditic crabs for later analysis.

SAMPLING DATE – Enter in dd/mm/yr format on the date pot is pulled.

STATION NUMBER – Same number as recorded on the Pilot House Log.

SAMPLING FRACTION – The numerator is the number of crabs sampled, denominator is the number of crabs caught. Leave blank if no subsampling is done. Ensure that when subsampling, only subsampled crabs are recorded on data sheets that contain a sampling fraction.

STRATUM – Record number for one of three strata: **1** = single station density; **2** = double station density; **3** = shallow-waters stations.

BUOY NUMBER – Record the buoy number of each sampled pot. In addition to standard fishing practice, the buoy number is used to confirm pot identity with the vessel captain during sampling. *This field is not entered in the database.*

SEQUENTIAL POT NUMBER – Same number as recorded on the Pilot House Log.

SPECIES – Enter the 1 or 2 digit code from the codes listed at the bottom of the form.

SEX – Enter codes listed at the bottom of the form; leave blank if unknown.

SIZE (MM) – Biological carapace length (lithodid and hair crabs) or carapace width (Chionoecetes and Dungeness crabs).

LEGAL – Record codes as follows: **1** = legal-sized crab [male blue king (5.5”), hair (3.25”), Tanner (5.5”), snow (3.1”) crabs]; **2** = sublegal-sized crab; **3** = immature female; **4** = mature female.

SHELL – Shell condition (age) – enter codes listed at the bottom of the form. See text for explanation.

EMBRYOS - Enter codes listed at the bottom of the form.

OTHER CONDITIONS - Enter codes listed at the bottom of the form; if more than one condition is noted, record additional conditions in the Comments section.

TAG SERIES and NUMBER – Enter series as a single capital letter; enter the 1-to-5 digit number.

Appendix D.4. Species Composition Form.

ADF&G 2004 ST. MATTHEW ISLAND BLUE KING CRAB SURVEY

RECORDER: _____

SPECIES COMPOSITION FORM

PG _____ OF _____

| | STATION NUMBER | | | SEQUENTIAL POT NUMBER | | | SPECIES NAME | NMFS 5-DIGIT SPECIES CODE | | | | | NUMBER CAUGHT | | | COMMENTS |
|----|-------------------|--|--|-----------------------------|--|--|--------------|---------------------------------|--|--|--|--|------------------|--|--|----------|
| | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | |

[D:\STMATT\STMATT04\FORMS2004.XLS: SPCOMP04 LJW 4/2004]

-Continued-

INSTRUCTIONS FOR SPECIES COMPOSITION FORM

This form is used to record the contents of each sampled pot. Include crab species sampled on the Crab Survey Data Form and all other captured animals. If the sequential pot number is unknown or a count of the animals is not available, enter the station number and leave the sequential pot number blank. Animals not identified on the survey will be collected, labeled, and preserved for later identification.

STATION NUMBER – Same number as recorded on the Pilot House Log.

SEQUENTIAL POT NUMBER – Same number as recorded on the Pilot House Log.

SPECIES NAME – Enter the common and/or scientific name.

NMFS 5-DIGIT SPECIES CODE – Enter code from the NMFS Species Codebook – March 2004.

NUMBER – Enter the number of animals caught.

RECORDER: _____

PG _____ OF _____

[D:\STMATT\STMATT04\FORMS2004.XLS: LFREQ04(2) LJW 4/2004]

INSTRUCTIONS FOR FISH LENGTH FORM

This form is used to record lengths (cm) for commercially important fish species caught in survey pots.

SEQUENTIAL POT NUMBER – Same number as recorded on the Pilot House Log.

SPECIES NAME – Enter the common and/or scientific name.

NMFS 5-DIGIT SPECIES CODE – Enter code from the NMFS Species Codebook – March 2004.

NUMBER – Enter the number of animals caught at the recorded length.

Appendix D.6. Tagged Crab Recovery Form.

INSTRUCTIONS FOR TAGGED CRAB RECOVERY FORM

The purpose of this form is to record survey captures of crabs tagged during the 1995, 1998 and 2001 St. Matthew Island blue king crab tagging surveys. Refer to form for coding. For fishery code, enter 'SU04' – denotes survey 2004 recapture.

ADF&G WESTWARD REGION TAGGED CRAB RECOVERY FORM

SPECIES _____ FISHERY CODE _____ OBSERVER/ DOCKSIDE SAMPLER _____

| SEQ. POT NO. | FLOY TAG SERIES & NUMBER | SIZE (mm) KING - CL TANNER - CW | LEGAL (a) | SEX (b) | SHELL (c) | FATE (d) | CAPTURE DATE | | | CAPTURE LOCATION (Note: "E." longitude if applicable) | | DEPTH (FM) | STATISTICAL AREA | ADF&G VESSEL NO. |
|-----------------|-----------------------------|---------------------------------------|--------------|------------|--------------|-------------|--------------|-----|------|--|--------------|---------------|---------------------|---------------------|
| | | | | | | | MO. | DAY | YEAR | N. LATITUDE | W. LONGITUDE | | | |
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |

(a) **LEGAL:** 1=Legal; 2=Sublegal.

(b) **SEX:** 1=Male; 2=Female.

(c) **SHELL AGE:** 0=Soft; 9=New-pliable; 1=New-hard; 2=Old; 3= Very

(d) **FATE:** 1=Retained for sale; 2=Released alive; 3=Dead (not retained for sale; found in deadloss pile or frozen whole for ADF&G/Observer sampling)

NOTE: If a tagged female crab, record additional information on the back of this form. Record comments for males and females on the back of this form

| | Received Tag or Tagged Crab From: Name, Address & Phone | Received Recovery Location Data From: Name, Address & Phone | Vessel Name | Processor Name | Sampling Date | | |
|---|--|--|-------------|----------------|---------------|-----|------|
| | | | | | Mo. | Day | Year |
| 1 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 2 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 3 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 4 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 5 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |

Edited by:

Date:

Entered by:

Date:

[D:\STMATT\STM2004\TAGREC.XLS L.WATSON 5/2004]

-Continued-

ADF&G WESTWARD REGION TAGGED CRAB RECOVERY FORM
(REVERSE SIDE)

| SEQ. POT NO. | EMBRYOS | | | | OTHER | COMMENTS |
|--------------------|---------|-------------|-----------|----------|-------|----------|
| | COLOR | DEVELOPMENT | CONDITION | % CLUTCH | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |

LIVE EMBRYO**COLOR**

1-tan
2-purple
3-brown
4-orange
5-purple-brown
6-pink
7-reddish
0-other (describe)

EMBRYO**DEVELOPMENT**

1-uneeyed
2-eyed
3-hatching - < 1/4 clutch
and matted setae)

EMBRYO**CONDITION**

1-dead eggs not
apparent
2-dead eggs <20 %
3-dead eggs >20%

PERCENT CLUTCH

0-barren, clean setae
1-barren, matted setae
2-clutch trace to 1/8 full
2-clutch 1/4 full
3-clutch 1/2 full
4-clutch 3/4 full
6-clutch 100% full

OTHER

1-dead
3-nemerteans in clutch
4-turbellarians in clutch
5-black mat syndrome
6-bitter crab disease
7-"cottage cheese" disease
8-shell disease ('torch')
9-*Briarosaccus callosus*
0-leatherback

| SPECIES | CHANGES IN EMBRYO COLOR | | COMMENTS |
|---------------------|-------------------------|---------------------|--|
| | UNEYED | EYED-WELL DEVELOPED | |
| Red King | Purple | Reddish | Occasionally brown or gray intermediate. |
| Blue King | Purple | Pinkish-reddish | |
| Golden (brown) king | Orange | Tan | |

[D:\STMATT\STM2004\TAGRECFEM.XLS L.WATSON 5/2004]

**ADF&G 2004 ST. MATTHEW ISLAND BLUE KING CRAB
CRAB STOMACH SAMPLE FORM**

| Date | Sample Number | Sequential Pot Number | Carapace Length (mm CL) | Comments |
|------|---------------|-----------------------|-------------------------|----------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

INSTRUCTIONS FOR CRAB STOMACH SAMPLE FORM

The purpose of this form is to document the date, sample and sequential pot number, and size of the crab from which the stomach was collected. Sample numbers will be unique and sequentially assigned.

Appendix D.8. Temperature Data Log.

**ADF&G 2004 ST. MATTHEW ISLAND BLUE KING CRAB
TEMPERATURE DATA LOG**

CTD/STR Serial No. _____

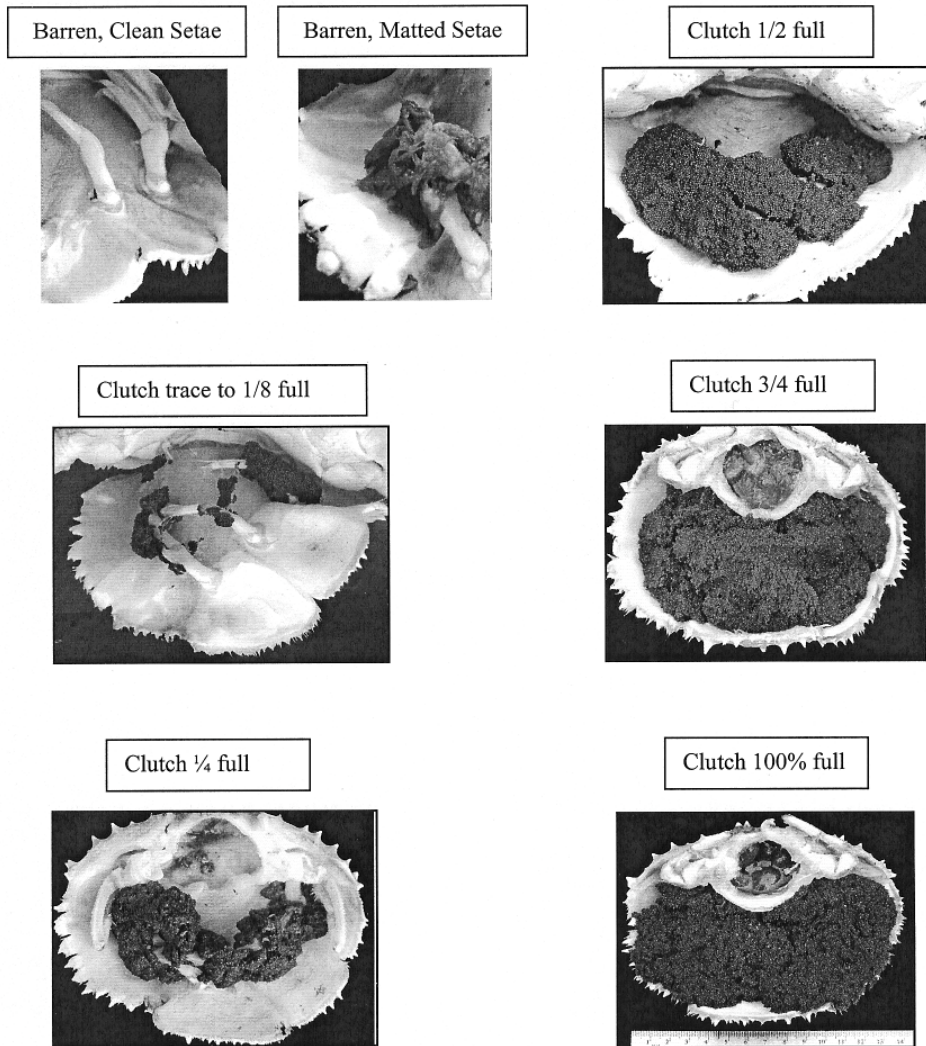
Recorder _____

| Date | SPN | Time Down | Time Up | File Name | Comments |
|------|-----|-----------|---------|-----------|----------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

INSTRUCTIONS FOR TEMPERATURE DATA LOG

The purpose of this form is to track each temperature recorder by deployment date, time deployed and retrieved, sequential pot number (SPN), and download filename. Fill out one log for each of the five units; see Equipment List (Table A.3.) for list of identifying serial numbers.

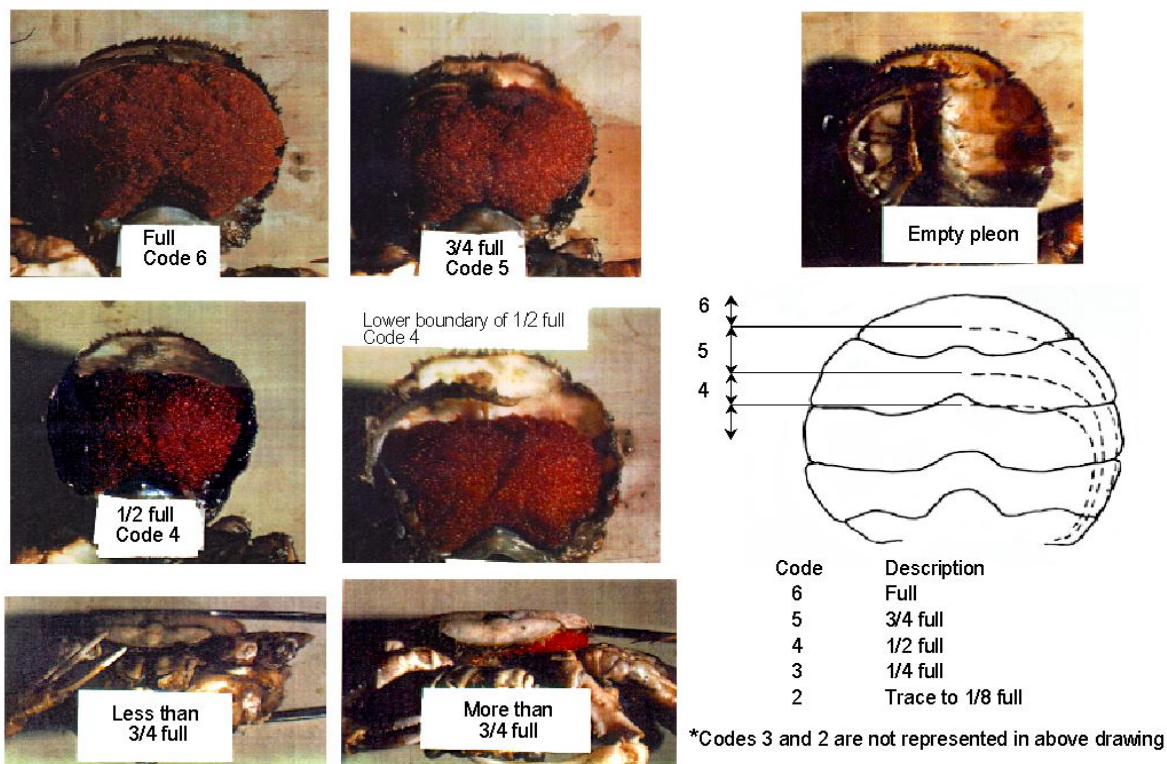
Appendix E.1. Blue King Crab Clutch Fullness Categories. (Source: S. Byersdorfer, ADF&G–Kodiak, pers. comm.)



| Code | Clutch Description |
|------|--|
| 0 | Barren, clean setae. No eggs or empty egg cases. Immature female. |
| 1 | Barren, matted setae. Empty egg cases present. Mature female. |
| 2 | Trace to 1/8 full. |
| 3 | Clutch 1/4 full. |
| 4 | Clutch 1/2 full. |
| 5 | Clutch 3/4 full. |
| 6 | Clutch 100% full. |

Appendix E.2. Snow Crab Clutch Fullness Categories. (Source: K. Gravel, ADF&G – Kodiak, pers. comm.)

NMFS clutch size codes - *Chionoecetes*



| Code | Clutch Description |
|------|---|
| 0 | Barren, clean setae. No eggs or empty egg cases. Immature female. |
| 1 | Barren, matted setae. Empty egg cases present. Mature female. |
| 2 | Trace to 1/8 full. |
| 3 | Clutch 1/4 full. |
| 4 | Clutch 1/2 full. |
| 5 | Clutch 3/4 full. |
| 6 | Clutch 100% full. |

Genetic sampling of *Chionoecetes* hybrids. At the request of Dr. Jean-Marie Sévigny (Maurice-Lamontagne Institute, Department of Fisheries and Oceans Canada, Mont-Joli, Québec) one pereopod sample from 45 to 50 *Chionoecetes* hybrid individuals will be collected. Data from collected samples will be used in a genetic project comparing the characteristics of snow crab populations from the Gulf of St. Lawrence, Greenland, and the Bering Sea. The sampling protocol for each sampled crab is as follows:

- 1) Measure and record carapace width (CW) and chela height (CH) to the nearest 0.1-mm, sex, and shell condition (Form B.1).
- 2) Autotomize pereopod 3 (2nd walking leg).
- 3) Cut a 1-cm long sample from pereopod.
- 4) Slit the carapace portion of sample to ensure that ethanol seeps inside and preserves fleshy part entirely.
- 5) Place in a labeled 20-ml glass vial and fill with ETOH (95%) at a 1:5 muscle to ETOH ratio.
- 6) After 24 hours, empty ETOH from vial and replace with new ETOH.
- 7) Avoid cross-contamination of samples by rinsing and wiping dissecting tools after sampling each individual.

Determination of biennial reproductive cycle in female *Chionoecetes opilio*. Evidence has been found that *C. opilio* females do have a biennial reproductive cycle in waters colder than 1.5°C. As measured on annual NMFS trawl surveys, ocean bottom temperatures near St. Matthew Island were at or below 1.5°C in the period 1990 - 2001. Egg and ova samples from *C. opilio* females will be collected to determine whether or not a biennial reproductive cycle exists in a portion of the population near St. Matthew Island. A total of 100 multiparous females will be examined. The following protocol will be used for each sampled crab:

- 1) Measure and record CW and abdominal width (greatest straight-line distance of the 5th abdominal somite) to nearest 0.1-mm (Form B.2).
- 2) Record shell condition, and egg color, condition, and clutch score.
- 3) Take a sample of approximately 15 eggs and stain in Bouin's solution for 5 minutes.
- 4) Examine eggs under microscope and record embryo development stage.
- 5) Record ova color and "fullness" (what percentage of abdominal cavity is taken up by ovaries).
- 6) Remove both spermathecae from abdominal cavity. Place left spermatheca in a vial filled with 95% ethanol. Place right spermatheca into a vial filled with 4% formalin buffered with seawater.

Size at maturity measurements of male *Chionoecetes opilio* males. The NMFS annual eastern Bering Sea survey will be sampling the same area as the St. Matthew Blue King Crab pot survey approximately 10 days prior to the pot survey. In areas of high *C. opilio* male catch, CW and CH measurements will be taken to the nearest 0.1-mm. Crabs ranging in size from 40 to 135-mm CW (both immature and mature individuals) will be measured for size frequency distribution comparisons between the catch in the trawl survey and the catch in the pot survey. Data will be recorded as shown in Form B.3.

-Continued-

Appendix F. (page 2 of 4)

Form F.1

DFO *Chionoecetes* Hybrid Genetics

Page ____ of ____

Vessel: _____

Cruise: _____

Proc. Date : ____/____/____

Recorders: ____/____/____/____

| Specimen # | Pot # | CW ^a | CH ^a | Sex ^b | SC ^c | Comments |
|------------|-------|-----------------|-----------------|------------------|-----------------|----------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | | | |
| 22 | | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |

^a: To 0.1 mm

^b: 1 = male; 2 = female

^c: NMFS shell condition code

[Hybrid_genetic_sampling.xls: K.Gravel 4/2004]

-Continued-

Appendix F. (page 3 of 4)

Form F.2

C. opilio Female Biennial Reproductive Cycle

Page ____ of ____

Vessel: _____

Cruise: _____

Proc. Date : ____/____/____

Recorders: ____/____/____/____

| Specimen # | Pot # | CW ^a | AW ^a | SC ^b | Eggs | | | Ovaries | | Embryo | |
|------------|-------|-----------------|-----------------|-----------------|--------------------|------------------------|--------------------------|--------------------|--------|--------|--------|
| | | | | | Color ^c | Condition ^d | Clutch size ^e | Color ^c | % Full | Stage | % yolk |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 17 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 19 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |

^aTo 0.1 mm ^bNMFS shell condition code ^cPantone color scheme ^dNMFS egg condition codes ^eNMFS clutch size code

[C_opilio_biennial_repro.xls: K. Gravel 4/2004]

-Continued-

Appendix F. (page 4 of 4)

Form F.3

***C. opilio* Male Size at Maturity Measurements**

Page ____ of ____

Vessel: _____

Cruise: _____

Proc. Date : ____/____/____

Recorders: ____/____/____

| Specimen # | Pot # | CW ^a | CH ^a | SC ^b | Comments |
|------------|-------|-----------------|-----------------|-----------------|----------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | | | | |
| 24 | | | | | |
| 25 | | | | | |
| 26 | | | | | |
| 27 | | | | | |
| 28 | | | | | |
| 29 | | | | | |
| 30 | | | | | |

^a: To 0.1 mm

^b: NMFS shell condition code

[Size_maturity_males.xls: K. Gravel 4/2004]

Appendix G. Fish Skeletal Comparative Collection. (Source: S. Dickson, University of Alaska - Fairbanks Interior-Aleutians campus, Unalaska AK, pers. comm.)

In 2003, a specimen collection program was initiated by the University of Alaska - Fairbanks to obtain samples from Unalaska Bay and surroundings, Pacific Ocean and Bering Sea waters, and nearby fresh water sources. In the short-term, this fish skeletal comparative collection serves local public education needs and archaeological researchers. The long-term objective is to build an Alaska-based archive of fish skeletons from both fresh and marine waters of Alaska. Specimens from the list below are needed for the collection.

Identify each specimen, label with date, location, and depth (fm), and return frozen specimens to Unalaska after the survey for pick-up to Shawn Dickson at 581-1666.

| Common Name | Scientific Name |
|-------------------------|--|
| Atlantic poacher | <i>Leptagonus decagonus</i> |
| Alaska plaice | <i>Pleuronectes quadrituberculatus</i> |
| Arctic cod | <i>Boreogadus saida</i> |
| Arctic flounder | <i>Pleuronectes glacialis</i> |
| Arctic lamprey | <i>Lampetra camtschatica</i> |
| Arctic sculpin | <i>Myoxocephalus scorpioides</i> |
| Arctic shanny | <i>Stichaeus punctatus</i> |
| Arctic staghorn sculpin | <i>Gymnocanthus tricuspis</i> |
| Banded gunnel | <i>Pholis fasciata</i> |
| Bearded warbonnet | <i>Chirolophis snyderi</i> |
| Belligerent sculpin | <i>Megalocottus platycephalus</i> |
| Bering cisco | <i>Coregonus laurettae</i> |
| Bering flounder | <i>Hippoglossoides robustus</i> |
| Bering poacher | <i>Ocella dodecaedron</i> |
| Bering wolffish | <i>Anarhichas orientalis</i> |
| Bighead snailfish | <i>Liparis megacephalus</i> |
| Brightbelly sculpin | <i>Microcottus sellaris</i> |
| Bristol snailfish | <i>Liparis bristolensis</i> |
| Butterfly sculpin | <i>Hemilepidotus papilio</i> |
| Capelin | <i>Mallotus villosus</i> |
| Crested sculpin | <i>Blepsias bilobus</i> |
| Decorated warbonnet | <i>Chirolophis decoratus</i> |
| Estuarine eelpout | <i>Lycodes turneri</i> |
| Eyeshade sculpin | <i>Nautichthys pribilovius</i> |
| Festive snailfish | <i>Liparis marmoratus</i> |
| Fish doctor | <i>Gymnelus viridis</i> |
| Fourhorn sculpin | <i>Myoxocephalus quadricornis</i> |
| Fourline snakeblenny | <i>Eumesogrammus praecisus</i> |
| Gill's fringed sculpin | <i>Porocottus quadrifilis</i> |
| Halfbarred pout | <i>Gymnelus hemifasciatus</i> |
| Hamecon | <i>Artediellus scaber</i> |
| Hookhorn sculpin | <i>Artediellus pacificus</i> |

| Common Name | Scientific Name |
|--------------------------|--------------------------------------|
| Kelp snailfish | <i>Liparis tunicatus</i> |
| Least cisco | <i>Coregonus sardinella</i> |
| Leister sculpin | <i>Enophrys lucasi</i> |
| Marbled eelpout | <i>Lycodes ravidens</i> |
| Ninespine stickleback | <i>Pungitius pungitius</i> |
| Okhotsk snailfish | <i>Liparis ochotensis</i> |
| Pacific Spiny lumpsucker | <i>Eumicrotremus orbis</i> |
| Pacific Tom Cod | <i>Microgadus proximus</i> |
| Pimples lumpsucker | <i>Eumicrotremus andriashavevi</i> |
| Plain sculpin | <i>Myoxocephalus jaok</i> |
| Polar eelpout | <i>Lycodes polaris</i> |
| Prowfish | <i>Zaprora silenus</i> |
| Rainbow smelt | <i>Osmerus mordax</i> |
| Ribbed sculpin | <i>Triglops pingelii</i> |
| Roughspine sculpin | <i>Triglops macellus</i> |
| Saddled eelpout | <i>Lycodes mucosus</i> |
| Saffron Cod | <i>Eleginus gracilis</i> |
| Shortfin eelpout | <i>Lycodes brevipes</i> |
| Slender eelblenny | <i>Lumpenus fabricii</i> |
| Small hook sculpin | <i>Artediellus miacanthus</i> |
| Smoothcheek sculpin | <i>Eurymen gyrinus</i> |
| Snake prickleback | <i>Lumpenus sagitta</i> |
| Spatulate sculpin | <i>Icelus spatula</i> |
| Stippled gunnel | <i>Rhodymenichthys dolichogaster</i> |
| Stout eelblenny | <i>Anisarchus medius</i> |
| Tadpole sculpin | <i>Psychrolutes paradoxus</i> |
| Threaded sculpin | <i>Gymnocanthus pistilliger</i> |
| Threespine stickleback | <i>Gasterosteus aculeatus</i> |
| Tubenose poacher | <i>Pallasina barbata</i> |
| Variegated snailfish | <i>Liparis gibbus</i> |
| Whitespotted greenling | <i>Hexagrammos stelleri</i> |

The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-6077, (TDD) 907-465-3646, or (FAX) 907-465-6078.